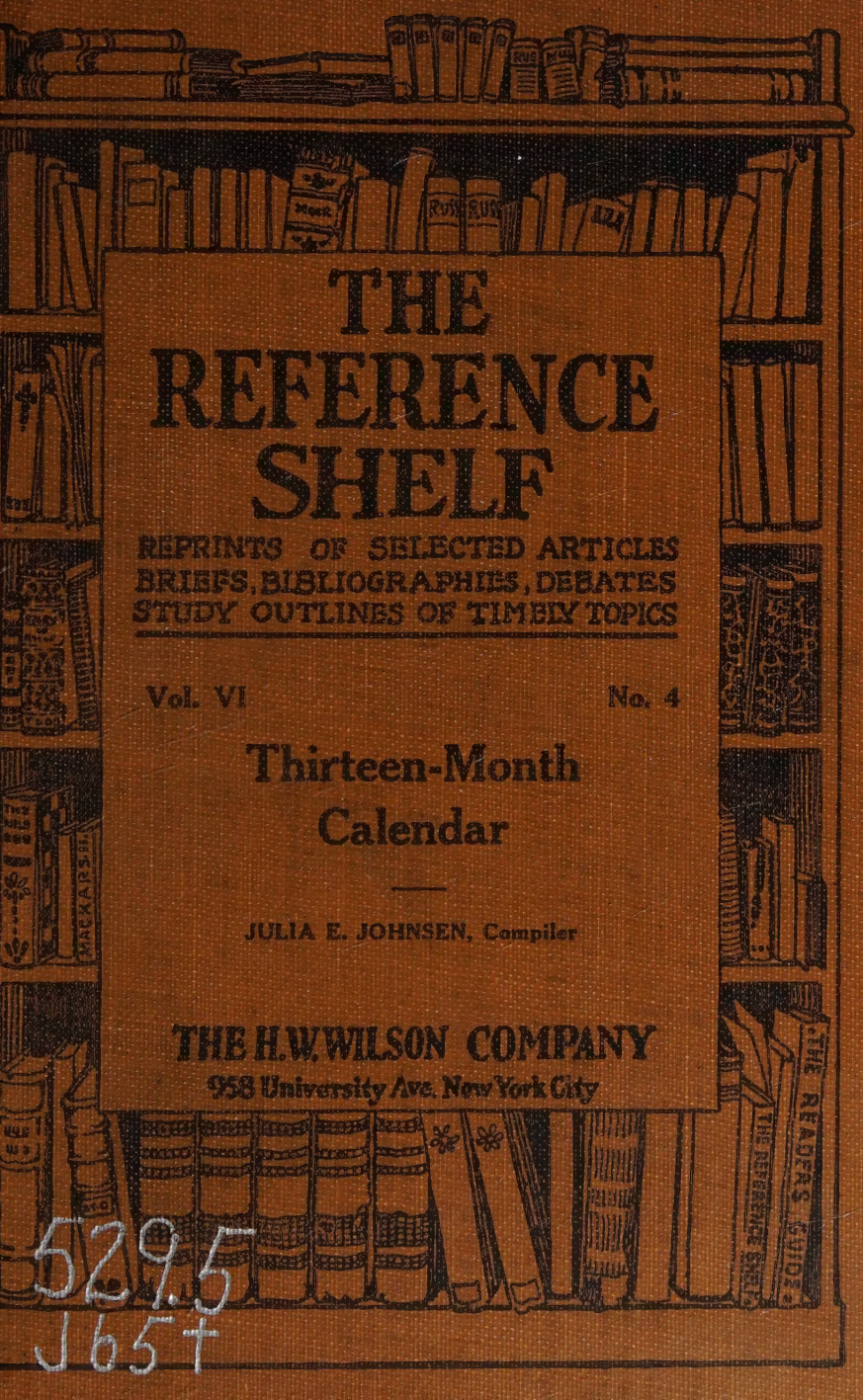
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REPRINTS OF SELECTED ARTICLES
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STUDY OUTLINES OF TIMELY TOPICS
Vol. VI
No. 4
Thirteen-Month
Calendar
JULIA E. JOHNSEN, Compiler
THE H.W.WILSON COMPANY
958 University Ave. New York City
THE READER'S GUIDE
THE REFERENCE SHELF

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THE REFERENCE SHELF

Volume VI Number 4

THIRTEEN-MONTH CALENDAR

COMPILED BY
JULIA E. JOHNSEN

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INTRODUCTION

The practical defects of the present Gregorian calendar have long been apparent to those whose activities have brought them into close relationship with this time-measuring unit. For as long as a half century, to search no further back, there has been speculation over the more perfect division of the true solar year. In the period 1910-1914 the possibilities of improvement were being considered and discussed in scientific circles and international associations and congresses. The close of the war saw it again brought to public notice and its discussion has been steadily increasing under the impetus of commercial, industrial and scientific interest in more accurate records, greater convenience, economy and effiency, so far as these are influenced by the time divisions of the year.

The subject of calendar reform is given weight by the fact that the League of Nations in 1923 assigned a committee to study and act upon it, and as a result of its activity national committees were recommended and to some extent have been organized or are being considered in the various countries, for the study and discussion of reform; and, further, that the calling of an international conference is an objective that appears in a fair way to being realized in the near future. In addition to this interest organizations of various kinds have special committees studying the question, conventions and conferences, international, national, scientific and other have given recognition to it in their discussions or by the adoption of resolutions, and there is apparently some governmental approval of reform. Not the least important consideration is the fact that pressure is being steadily exerted by interested bodies and individuals to defin-

itely influence public opinion in favor of a proposed change. Such definite and studied direction of thought calls, at the least, for a clear and understanding attitude, that the subject may be wisely met.

Although plans proposed for the reform of the calendar are many, embodying every conceivable change from the mere lengthening of February to the changing of the beginning or length of the year, yet the publicity given the thirteen month year scheme, variously called the International Fixed Calendar, the Comte, Cotsworth, or the Eastman plan, has given it preponderantly favorable consideration in our country; and the action of the League of Nations Committee in analyzing a hundred and eighty-five plans for calendar reform and eliminating as impracticable or otherwise undesirable all but two main groups, has tended to narrow advocacy to these leading schemes. These two groups of reform are the equalizing of the quarters of the year, and the re-division of the year into thirteen months in place of twelve. Intercalary days may be considered an essential part of the latter plan, although an occasional intercalary week is sometimes suggested in place of such blank days, since it is proposed to make this calendar fixed and unchangeable. The equalizing of quarters plan is advocated both with and without intercalary days or an intercalary week, according to whether a fixed calendar is considered essential or not. Some minor differences exist among advocates of either groups of plans, such as the beginning of the week on Sunday or Monday, the considering of the intercalary day the last or the first day of the year or the placing it elsewhere, but in the essentials of the plans there is substantial agreement. There is also a considerable movement active in bringing about stabilized date for Easter.

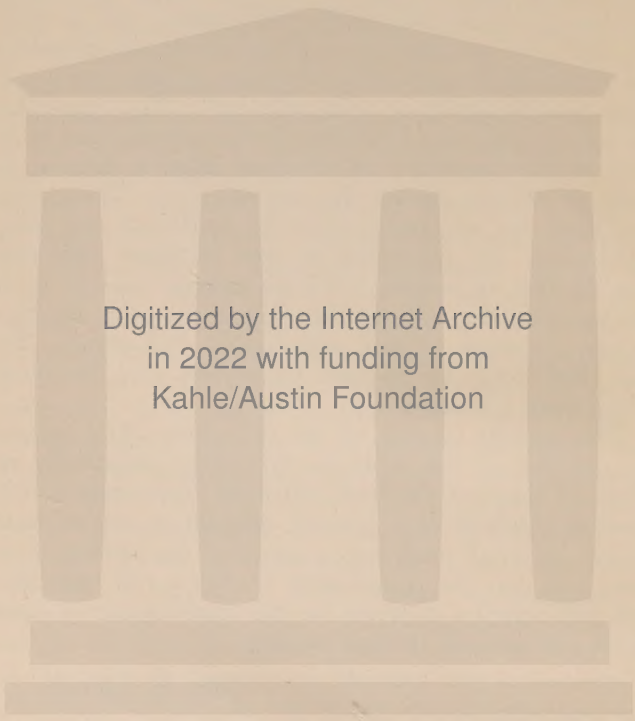
The question is an international one by reason of the fact that the adoption of a reformed calendar by any one or a few leading nations would be largely impracticable.

The world is closely welded together and interdependent at innumerable points of contact. The action of certain nations abroad in changing to the Gregorian calendar since the late war has brought an important portion of the world under this system of time reckoning, and the breaking of this widespread conformity to a common chronology would be highly unfortunate. It is upon the action of an international conference as influenced and approved by national action that a change in the calendar would doubtless ultimately rest. The immediate interest of advocates of reform at the present time is related to the possibility of bringing about a decision in favor of reform during the current year. This would give time for necessary scientific, statistical and other preparation for beginning a new calendar reckoning with the first of January 1933, the nearest year in which Sunday coincides with the first day of the year, and thus permits a change without unnecessary dislocation. The year 1939 would be the next convenient year for establishing such a change.

The present number of the Reference Shelf follows the practice of the series in presenting impartially reprints of some of the best and most representative discussions available of a general, affirmative and negative nature. A brief summing up some of the leading arguments pro and con is included. A fairly full and classified bibliography is given for the convenience of those wishing to pursue further reading.

Julia E. Johnsen

July 23, 1929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BRIEF

RESOLVED: *That a change to the thirteen-month calendar should be approved.*

INTRODUCTION

I. Action taken in the interests of a reformed calendar make its discussion a timely one.
   A. The League of Nations has made recommendations for its world-wide study.
   B. National organizations and individuals in our own and other countries are urging it.
   C. Pressure is being brought for congressional action.
   D. The possibility of an international conference in the near future makes it desirable that public opinion should be informed.

II. The three main plans of change offered are:
   A. The equalizing of quarters of the year.
   B. The equalizing of quarters together with one zero day in ordinary years and two in leap years.
   C. A thirteen-month calendar with intercalary or zero days as in plan "B".
      1. This is the plan most widely favored in America.

III. The essential features of the thirteen-month calendar are:
   A. Thirteen months of twenty-eight days, or four complete weeks, each.

B. Intercalary days without week day name or date, to take care of the extra year day and leap year day.
   1. This change would make it perpetual, a single month being the model for all future months and years.

IV. The issues are:
   A. Is it desirable to change the calendar at the present time?
   B. Is the thirteen-month scheme a desirable one?
   C. Is the thirteen-month plan the best and most practicable plan that can be devised?

Affirmative

I. Reform of the calendar is called for.
   A. Our present Gregorian calendar has many serious defects.
      1. There are irrational variations in it.
         a. The months are variable.
            (1) They contain from 28 to 31 days.
               (a) There is 11 per cent difference between February and March.
            (2) They do not contain an equal number of weeks.
               (a) Split weeks usually mark the beginning and end of each month.
         b. There is lack of fixity in it.
            (1) There is non-agreement of day names and dates.
            (2) It is non-perpetual.
               (a) It must be consulted for every new week and month.

(b) An entirely new calendar is necessary every year.

(3) Easter and holidays wander.

(a) Easter ranges over a period of five weeks.

(b) Holidays and anniversaries wander through all the days of the weeks.

(4) Dates of periodical events can never be fixed with precision.

(a) Special decisions must be made each year.

B. The demands of modern life call for a regularized and efficient calendar.

1. The present cumbersome calendar is a standing source of confusion and misunderstanding.
2. The need is felt to simplify and standardize units of time and other measurements in the most scientific and approved way consonant with modern advance.
3. Increasing need is felt for more exact, accurate, and comparable statistics and records of all kinds.

a. Statistical records are becoming an increasingly important factor in social progress.

b. Business is becoming more and more dependant upon exact and accurate records.

4. Modern life is becoming increasingly intricate and complex.

C. Interest in calendar reform is widely shown.

1. The League of Nations has recommended its serious study with a view to international action.

2. National committees are taking up the subject.
3. Extensive interest and approval has been manifested in economic, scientific, governmental and other groups, as well as among prominent individuals in industrial and public life.
4. Effort has long been made to have a fixed Easter adopted by all Christian churches.

D. There is no reason inherent in the calendar that should prevent change.
   1. Its status is not sacrosanct.
      a. It was developed in an arbitrary, capricious, and unscientific manner.
         (1) It was partly due to superstitious and political considerations.
      b. We retain it through force of custom and tradition.
      c. The month has no relation to known facts.
         (1) It has no relation to anything in astronomy or human experience.
         (2) It has no religious significance.
         (3) It has no relation to the weeks.
   2. There is ample precedent for a change in the divisions of time.
      a. Many changes were made repeatedly in early calendars.
      b. In modern times alone calendar changes have been widespread.
         (1) In 1582 ten days were dropped from the calendar.
         (2) In 1752 England and her colonies dropped eleven days.
         (3) In countries abroad millions

of people have come under calendar change since the war.

E. A change in the calendar would be simple, easily made, and feasible.
   1. An Act of Congress could be passed stating that it would become effective on a certain date.
   2. It would be put into effect at a time that would cause the minimum of disturbance.
      a. The first year not a leap year to begin on Sunday, which would be 1933.
         (1) This would give ample time to prepare for the change.
   3. The change would not involve social or economic confusion.
      a. The Act would include adjustment tables and provide that all dates of the old would be automatically changed to specified dates of the new calendar.
      b. It would provide for the prorating of fixed changes of every kind based on the present division of the year.
      c. The practical difficulties would be no greater than was connected with the adoption of standard time.
   4. Changing the dates of our anniversaries would mean little.
      a. None of our present anniversaries which date back more than a century and a half now falls on the date on which the event originally occurred.

II. The proposed thirteen-month calendar is a desirable plan.
   A. It would correct the outstanding defects of our calendar, and satisfy the main objects of reform.

1. It would regularize the calendar in the most thorough way consonant with the fixed lengths of the year and day.
   a. It would make the month an exact multiple of the week, and make each month exactly the same length.
      (1) This change is one of the most marked advantages to be gained in the reform of the calendar.
   b. It would synchronize dates and week days.
      (1) The same day of the year would always occur on the same day of the week.
         (a) The year would always begin on the same day.
         (b) Holidays would always occur on the same day.
   c. It would establish a perpetual calendar.
      (1) The calendar for one month would be good for all succeeding months and years.
         (a) Every month would be exactly like every other.

B. It would bring many marked advantages and benefits.

1. It would be of far-reaching advantage to business.
   a. It would promote efficiency and economy.
      (1) It would simplify accounting practices.
         (a) Do away with laborious calculations, eliminate adjustments made necessary by present calendar in the

rendering of reports, comparisons of unequal months, of unequal number or value of working days, etc.

(b) Facilitate calculations of interest, business transactions, etc.

(c) Do away with confusion where income is on monthly and outgo on weekly basis or vice versa.

(2) It would increase the value of statistical work.

(a) Do away with inaccurate, misleading, confusing comparisons.

(b) Statistical work would probably be rendered 50 per cent more effective.

(3) It would reduce expense.

(a) Calculations and adjustments would be less costly.

x. Clerical work would be reduced.

(b) There would be faster turnover of money.

x. The same business could be handled with less money.

(4) Its advantages have been recognized by many industries in America and Great Britain, which have already adopted a thirteen-month division of the

year for accounting and statistical work.
(a) It has been in operation in at least two concerns over thirty years.

b. The stabilization of Easter would be of far-reaching advantage to industries depending on the Easter trade.
c. Only universal adoption would give all the benefits to business.
(1) The adoption of a thirteen-month calendar for business while maintaining a twelve-month calendar in civil life, brings the obvious disadvantage of using two calendars.

2. It would be of scientific advantage.
a. Would add greatly to the value of scientific studies and statistics.
b. Many scientists have evinced interest and approval in the proposed reform.

3. It would be of benefit to religion.
a. Would fix the date of Easter and other religious holidays.
b. Would establish uniform religious observance.

4. Important social advantages would accrue.
a. It would facilitate social activities and engagements.
(1) Facilitate the fixing of permanent dates for meetings, sessions, schedules, etc.
(2) Facilitate the recollection of dates.
b. It would make possible the fixing of holidays on Mondays of the week in which they occur.

(1) This would extend the week end periods of rest and recreation to two and one-half or three days.
(2) It would be of far reaching benefit to health.
(3) It would do away with the inconvenience and disorganization of broken weeks both socially and industrially.

c. It would be financially beneficial.
(1) Would coordinate periods of earning and spending.
(2) Would simplify budgeting.

C. A thirteen month calendar would be without serious disadvantage.

1. There is no valid objection to thirteen months in place of twelve.

a. The objection to the number thirteen is largely founded on superstition
(1) This is not sufficient ground for rejecting a reform.

b. A thirteen month year is sufficiently divisible for all practical purposes.
(1) Quarters and half-years are readily found.
(a) They would consist of 13 and 26 weeks respectively.
(2) Divisions of the year into large units are less important than months.
(a) Accounts and reports for quarters and half-years are less important and less frequent than for the months.
(b) Divisions into thirds and sixths of the year are of

relatively small importance.

c. That thirteen months is not a scientific division is not material.
   (1) No exact division of the year is possible under the present year and week length.
   (2) A change should in any case be practical rather than scientific.

2. There is no sound objection to intercalary days which would occasionally break the seven-day succession of Sabbaths.
   a. The observance of the seven-day week in Europe dates back only to Constantine the Great.
   b. As indicated in Pamphlet "C" of the International Fixed Calendar League inserted days are sanctioned by Mosaic law.
   c. The occasional observance of two Sundays in succession would not, to all practical purposes, break the seven-day succession of a day of rest.
   d. From a scientific standpoint days are lost or gained in travel over the international date line.
   e. The intercalary day principle has wide support.
      (1) It has been suggested in most of submitted plans for reform.
      (2) It is contained in two of the three plans retained by the League of Nations after its analysis of plans.
      (3) It is largely preferred to the intercalary week principle, which would also establish a perpetual calendar.

(a) An intercalary week would further throw the week out of balance.

3. The inconvenience to be caused by a change should not operate against its adoption.
   a. Any change in the calendar would cause inconvenience for a time in some quarter.
4. Most of the objections to the thirteen month calendar are merely sentimental and would disappear if the plan were adopted.

III. The thirteen-month calendar is the best available plan as a unit of the time measurement for the calendar.

A. The equalizing of quarters scheme is not as acceptable as the thirteen-month plan.
   1. It is not sufficiently thorough.
      a. It merely evens up quarter years so far as may be possible.
      b. If a reform is considered at all it should be thorough and lasting.
   2. It does not establish equality between months.
      a. Months of thirty and thirty-one days are provided.
   3. It does not establish an exact relation between weeks and months.
      a. With one exception the months contain a few days over four full weeks.
      b. First and last weeks may still be split weeks.
   4. It does not establish synchronization of days and dates, unless intercalary days are adopted in this scheme as in the thirteen month plan.

a. Even when the intercalary day plan is included, the correspondence is only between days and dates of the first, second, or third months of each quarter.

5. It has fewer advantages for statistical work and comparability.
6. It does not remedy certain disadvantages to business.
   a. Split week payrolls and expenses.
   b. The different number and value of specific days.
      (1) Months of five Saturdays or five Sundays, etc.
7. It does not have such large support, especially in our country.

B. No other plan will, at this time, meet the need for reform.
   1. No other has important support and approval.
   2. No more radical reform is desirable.
      a. Changing the week length.
      b. Changing the beginning or length of the year.
      c. Changing the year into months of considerably different lengths.
   3. No minor reforms are worth disturbing chronology to attain.

C. It is questionable whether any further plan will be devised which is better adapted to an improved calendar than the present scheme.
   1. The subject has already had wide and long study by persons most competent to judge it.

NEGATIVE

I. It is uncalled for and unwise to institute any radical reform of the calendar at the present time.
   A. There are deep-seated reasons for retaining the present calendar unchanged.
      1. It is sanctified by tradition, long usage, and widespread establishment.
      2. It has met our needs for time measurement very well, with perhaps the exception of the February irregularity.
         a. It has maintained the year at scientifically accurate length.
         b. It has maintained the seasons in their proper relation to the year.
      3. Any change should be long and well-considered before being made.
         a. It should be made only for the weightiest reasons and widespread benefits.
         b. It should be made only after exhaustive study to determine conclusively the best change.
            (1) When made, a change should be final for all time.
   B. A change in the calendar would entail great inconvenience and confusion.
      1. It would dislocate world chronology.
         a. For a time it would throw out all dates in relation to events and records.
            (1) It would cause great practical difficulty in adjusting the new and the old.
      2. Other great complications and expense would be involved in making the change.

a. It would cause change and confusion in regard to all anniversary dates, birthdays, holidays, and other fixed events.
b. It would be necessary to use two calendars for a considerable time.

C. A change would be neither simple nor feasible.
1. To be feasible it would have to be adopted simultaneously by all leading countries.
a. Any divergence would renew difficulties in international intercourse due to different chronological reckoning.
b. It is doubtful if those countries which have recently adopted calendar change would be disposed to make a second change in the near future.
2. It would have to be acceptable to all important groups in our own country.
a. Religious, administrative, economic, scientific, etc.
3. It would have to be approved by the various states in our country.
a. It is questionable whether the Federal government has the constitutional power to bind the states to a change of time.
4. Any dissenting country, state, or group would make inevitable the confusion and drawback of the use of two calendars.

D. A perfect calendar cannot be established.
1. There is no perfect correlation between a year, months, weeks, and days.
2. The length of the year is fixed and cannot be changed.
a. It is based upon the relation of the sun to the equinox.

3. There is no likelihood that the week can be changed.
   a. Custom, antiquity, and religious practice are too firmly against it.
4. The length of the day cannot be changed.

E. The extent of sentiment for a change is doubtful.
1. There is as yet no definite public demand for it.
   a. Public opinion in the mass in our own and other countries is probably little cognizant of the problem and its merits or demerits.
   b. Few groups relatively have expressed themselves.
2. The support given the movement is preponderantly commercial and economic.
3. The fact that many organizations and individuals have registered approval of it indicates little.
   a. Resolutions of approval may be dictated by a minority in control, or without proper canvas of membership.
   b. Approval may register mere opinion rather than sound study.
4. Propaganda has influenced much of the discussion.

II. The proposed thirteen month calendar is not a wise or desirable scheme.

A. There are serious objections to a thirteen month division of the year.
1. From the practical standpoint thirteen is a prime number and not divisible.
   a. The year would be divisible only by broken months.

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(1) Halves, quarters, thirds and sixths would be 6½, 3¼, 4⅓, and 2⅙ months respectively.

b. By even weeks it is divisible only into the half and quarter year.

(1) Twenty-six and 13 weeks would constitute a half and a quarter year.

(2) A third of the year would be 17⅓ weeks and a sixth would be 8⅔ weeks.

c. Such a principle of division is entirely foreign to our practice in constructing tables of interrelated units.

2. There would be appreciable prejudice against the proposed division.

a. The number thirteen is subject to more or less widespread superstition.

(1) However irrational to modern thought this opposition could not be overlooked.

(2) In addition to thirteen months under the proposed plan, Friday the 13th would occur every month.

B. There are serious objections to a calendar which would contain one or more intercalary or blank days.

1. It would be a radical and unwarranted change.

a. It would invalidate the prime reason for which a calendar exists.

(1) It would interrupt the continuity and accuracy of time reckoning.

(a) We can have no exact date unless we include these omitted days.

b. The blank day principle would break time-honored and unbroken succession of the seven-day week.

(1) In all past changes of the calendar the seven-day sequence of the week has been religiously maintained.

(a) Changes in the month have been made to correct the length of the year, but they have not altered the week.

2. It would be an unwarranted interference with religious practices.

a. All who hold to a strict observance of a seventh day Sabbath or a seven-day week from Sunday to Sunday would have their observance still further complicated.

(1) In the course of the years the true Sabbath would wander through every day of the week.

b. Any attempt to introduce intercalary days without the practical concurrence of religionists would result in confusion.

(1) It would bring about divisions in the church between those who strictly interpret the seven-day week and those who do not.

C. The intercalary week as a substitute for intercalary days would be objectionable.

1. It would throw the calendar further out of position with relation to the tropical year.

a. Under the intercalated week the range over a small number of years would be a week, and over a large

number of years would be eleven days.

(1) With the present calendar this range for any one year is a day only, and for even a long period of years is less than two days.

b. The odd week would complicate matters and create confusion far more than would the extra day.

D. The beneficial effects of the proposed thirteen month calendar are exaggerated.

1. The so-called benefits of a perpetual calendar are overrated.

a. Synchronization of day and date are in no way essential.

(1) It answers every social need to consult the calendar or fix the approximate time or date.

b. A perpetual calendar would in any case not be attained if we are always dropping out dates for intercalary days.

2. It is not essential to have months multiples of weeks.

a. What is mainly sought is to have as nearly equal units as possible and invariability in time reckoning.

3. The advantages to business are overrated.

a. Efficiency and economy are overrated.

(1) There would be thirteen accounting and settlement periods, with their added expense.

(2) In general a greater number of adjustments would be required in comparing past statistics and dates than under the present calendar.

(3) Accounting by months is more important than by groups of weeks.
   (a) Many business obligations are made to run for three, six, or nine months.
   (b) Interest and dividends are frequently payable quarterly, semi-annually, or even six times a year.

b. The disturbance of statistical accuracy is not obviated.
   (1) Extra-calendar days would still upset exact comparisons.
      (a) A vast amount of activity would go on notwithstanding the implied blankness.
      (b) The zero days must be reflected in one month or another, which is thus thrown out of exact comparability with others.
   (2) Holidays would continue to affect comparability.
      (a) They would occur in some months and weeks but not in others.
   (3) Confusion caused by floating Sabbaths would still further complicate records.
      (a) They would be observed to a more or less extent in various localities.
   (4) Statistics are frequently noncomparable in units of less than a year in any case.

(a) There are important variations in the months and through the seasons, which tend to average themselves only in the course of the year.

c. Other business disturbances would be brought about.
   (1) Litigation over dates and settlements.

d. The proposed change would merely carry standardization in business to a fault.

4. The importance of the proposed calendar to science is exaggerated.
   a. Only a relatively few scientists have expressed themselves definitely in favor of reform.
   b. Those who consider the desirability of reform are interested primarily in a regularized calendar.
      (1) They desire accurate statistics.
      (2) There is no general agreement upon a specific plan by which it is to be attained.
         (a) They are willing to accept the thirteen month calendar if it is the best regularized calendar that can be put over.

5. The social and general advantages are overrated.
   a. There would be little or no appreciable gain in correlating social life with exact periods of the calendar.
   b. The fixing of holidays on Mondays has no essential relation to the thir-

teen month plan that could not be brought about under the present calendar.

(1) We could, if we felt the change called for, establish holidays on Mondays of the weeks in which they occur, just as holidays now falling on Sunday are frequently observed on Monday.

6. The fixing of Easter is relatively unimportant.
   a. It is of concern mainly to churchmen and the Easter trade.

III. The thirteen month calendar is not the best devisable calendar scheme.
   A. The present calendar has many advantages.
      1. It has every advantage of wide and uniform use.
      2. It is as astronomically correct as is devisable under the present year, day and week length.
   B. If any changes are desired they can be attained without the widespread inconvenience and confusion that will result from the change to thirteen months with minimum change and upheaval.
      1. The restoring of February to its original length would tend to equalize the months and do away with the great outstanding objection to the variability of the months.
      2. A more thorough change could be attained by equalizing the quarters.
         a. The months in each quarter could be uniformly 30, 30, 31 days, or 31, 30, 30 days.

(1) The extra year day and leap year day can be distributed so as to equalize the half years in leap year, and in ordinary years would make merely a day's difference.

(a) This difference cannot be disregarded in any calendar, since even intercalated days must be considered in all practical affairs.

b. The equalizing of quarters would stand a better chance of adoption both at home and abroad.

(1) Less opposition would be encountered.

(a) It is less radical.

(2) It is more favored abroad than the thirteen month calendar.

C. All the essential objects of reform can be attained under the present calendar, or with the above suggested changes.

1. More exact comparability of statistics and uniform records.

a. It is absurd to indicate that records are not reasonably comparable.

(1) Trends are readily apparent to experts.

D. If other objects of reform are desired they can be attained under the twelve month division.

1. A perpetual calendar can be attained.

a. Intercalary days have been suggested under the equal quarter plan exactly as under the thirteen month plan.

(1) Under this a quarter year would be a model for all subsequent quarters.

b. A perpetual and synchronized calendar could be attained with intercalary weeks every five or six years.

(1) This would do away with objections to zero days and the breaking of the seven-day week.

2. A fixed Easter can be included under the twelve month plan as well as under thirteen months.

a. It could be fixed for the second Sunday of April, or any more desirable time.

b. It is an ecclesiastical and not a civil question and in any case would have to be settled independently by the churches.

3. A special subsidiary calendar could be used purely for purposes of industry and statistics, where felt desirable.

a. This is done at the present time.

b. The use of a special statistical calendar apart from the civil calendar causes little practical inconvenience.

c. It is illogical to assume that world chronology should be upset merely for the convenience of statistics and business.

4. The only thing that cannot be attained under the twelve month calendar as well as under the thirteenth month is to have a single month the model for all months, and the month an exact multiple of weeks, uniformly.

E. Many suggestions for other changes have been submitted that at any rate should have adequate publicity and thorough discussion before being eliminated, if a change should be thought desirable.
   1. That the League Committee eliminated other plans is not conclusive.
      a. A calendar change is too important a step to be determined by the findings of a small committee.

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GENERAL DISCUSSION

THE JOINTS OF TIME[1]

THE reason that the year begins on January 1 is a "pretty reason," as Lear's poor fool would say. Julius Cæsar, when he reformed the calendar in the year 46 B.C., evidently had in mind to begin the year with the shortest day. The winter solstice at Rome occurred in that year on the twenty-fourth of December of the Julian calendar; consequently the first day of the year would have fallen on December 25. But he delayed it seven days out of regard for prevailing customs and the superstitions of the people. As they had been accustomed to a lunar calendar, they would be better satisfied if the first year of the new calendar came in with the new moon. Accordingly the mean new moon was carefully computed and the new calendar had its beginning on the first of January, 45 B.C., at sixteen minutes past six in the afternoon.

Among all peoples, in all ages, it has been the custom to start the year, whether civil or ecclesiastical, with either the winter or summer solstice or the vernal or autumnal equinox. These times seem to mark the natural beginnings for reckoning the circuit of the seasons. The result of Cæsar's little stroke of diplomacy is that our year now has no relation to astronomic fact or logical reason. It has relation only to superstitions and political considerations which no longer exist. The history of the calendar is a struggle between human nature and arithmetic, the former not wanting to give in to the conclu-

[1] From article by Charles D. Stewart, Hartford, Wisconsin. *Atlantic Monthly.* 137:10-22. January, 1926.

sions of the latter. This history, philosophically considered, not only serves to give us our bearings with regard to the problem of time measurement, but is a subject of considerable interest in itself.

A year consists of 365 days, 5 hours, 48 minutes, and 45.51 seconds. From the standpoint of one who is trying to equip the universe with some practical system of time measurement, this sort of year is manifestly ridiculous. In a practical system of measurement each larger unit should be exactly divisible by the smaller unit next below it.

A month has a mean length of 29 days, 12 hours, 44 minutes, and 2.7 seconds. This is equally absurd. We cannot very well deal with months and years which begin and end with such utter disregard of the smaller units that we have these fractions of a day on our hands.

What, then, is a day, let us ask. That it is not an acknowledged part of a month or a year is a fact which the above figures make sufficiently plain. Nature did not intend it to be such. A day is a day. It is sufficient unto itself, and it is wholly unconcerned about any other unit of time.

In a foot there are a certain number of inches of equal size; and in a bushel the pecks are of like content. But what is a month? There are said to be twelve months in a year, but this statement means little when you consider that the months do not fit into the year except by being altered to a variety of sizes!

As man did not make days, months, and years he is not, of course, to be held accountable for them. But he did make hours, minutes, and seconds, and so it would seem that as a matter of convenience and common sense he would have chosen such smaller time units as would fit in with and be a common divisor of the units already established. And no doubt he would have done so if he could. But evidently there were difficulties in the way; for when we state the length of a year or of a month in

fractions of a second we are simply saying that these larger units are not divisible into any sort of time that man has been able to discover or invent.

Doing as best he could, man divided the day into parts which were equal but which fitted nothing further; and while his work might seem careless, inconsistent, and entirely incompetent, it is not so bad by comparison. For neither do days fit into months, nor months into years, nor years into any astronomical cycle which the heavens exhibit. It is all as bad as our English system of weights and measures; and the whole world knows how illogical and inconsistent and altogether incompetent that is.

Contrary to what any mortal member of any academy would expect, the heavens are *not* constructed on the metric system! They do not countenance or make possible any such mechanical notions of perfection upon the part of man. Consequently the time is out of joint; and as man is a measuring and record-keeping animal there has been constant challenge to his intellect to set it right.

The whole truth of the matter is that Nature has offered us three different standards of time measurement —the day, the month, and the year. We have got to make a choice and abide by it. We may not accept them all as if they were harmonious facts and parts of a heavenly clockwork. That is just what they are not. Sun and moon revolve and rotate as they please; each is true to its own appointments. But the sun takes no care that years shall be divisible into months; and neither does the sun or moon time its evolutions to fit in with that standard of measurement which we call a day.

And this is a fact which is totally unacceptable to the mind of man. There is something about it which is obnoxious to human nature. If man, instead of God, had made the universe he would surely have made months that were exactly divisible into the year. This is a safe assertion in view of the fact that for ages he stuck to the moon as a standard of measurement while at the same

time he tried to drive the chariot of the sun. We like to think that the universe is all working together, cogged and clocklike, with wheels that are proper multiples of one another—the whole acting as one big time system. If it is not so, then it ought to be so, and it is for us to bring the stars into harmony.

Of course there is but one way. That is to assume that they rotate and revolve thus and so. Consequently we have made the year a convenient length; and we have invented a system of leap years, leap months, and leap centuries to put us periodically into step with the facts. Finding ourselves compelled to deal in fractions of a day, we borrow from time, or extend credit to it, and then set things approximately right on a clearing-house system. We save up our scraps of time till we have enough to make a day, and we add it to a year; but as this is too liberal we pause once in a hundred years to take a day back; and as this is just a little too parsimonious we remember every four-hundredth year not to take the day that was coming to us. And for this temporizing with time we are hardly to be blamed. For the day and the year are each important to us; and when each insists upon being the sole standard of measurement, what else are we going to do about it?

Up to the time when our present form of calendar was adopted, all peoples, with the exception of the Egyptians, went strictly by the moon. A month was a month, an average duration of 29½ days; and it was of no very vital concern to them that twelve of those months amounted to only 354 days instead of a proper year.

To a people adopting a form of calendar the exact length of the year seems to be of no great importance. The year, with its four seasons, is supposed to bring a progressive change of climate; but when we consider that mere spells of weather make irruptions upon the seasonable climate and set the year backward or forward by days and weeks, an astronomer's information as to the

exact number of days in a year would seem to be of mere academic interest.

But an exact foreknowledge of the phases of the moon is of immediate and practical importance. Besides lighting the way for travelers and holy pilgrims, and thus making itself of prime importance in the regulations of religion and commerce, the moon was so obvious a timepiece, and so easily determined in its comings and goings, that it naturally became the first standard of measurement. A discrepancy of a week or two between twelve lunar months and the length of a solar year would appear to make no great difference in practical life.

But such a discrepancy is cumulative. The error keeps growing; it adds to itself year after year; and pretty soon it amounts to months. The inevitable result is that the months rotate through the seasons. And no people, whether herdsmen or planters, can afford to go by dates that are completely out of harmony with the solar year.

It was a puzzling prospect that opened up before the eyes of our forefathers when, after much effort to construct a satisfactory calendar, they discovered the true nature of the difficulty. They made use of months that lasted from moon to moon; but no particular number of moons fitted into a year! When they tried twelve there was a considerable remainder of time which that twelve-month did not fill out; consequently, their first month of the year, starting eleven days before the actual solar year was ended, would cause a falling behind of the season with regard to the supposed date. Each year would fall farther behind, the result being that the months revolved rapidly through the year. The practical effect of this was that a winter holiday, such as our Christmas, would get around to midsummer; and all the while they were carefully observing its month and date! And a summer festival would work its way, perforce, to the middle of winter! This was very embarrassing. It not only made

an undesirable state of affairs with regard to religious and other holidays, but it was confusing to the planter, a certain day of the month meaning nothing in his line of endeavor.

This harassing state of affairs prevailed among the early Greeks and Romans and troubled the mind of the world generally. It continued to work confusion at Rome up to the time the present form of calendar was adopted. When Julius Cæsar took over the solar year from the Egyptians, computed time at Rome had gained eighty days on actual time. And yet the priests had been accustomed to throwing an extra month into the year whenever it seemed to need it, after the manner of a crew dressing the ballast in a ship.

One might easily suggest that, if a lunar twelvemonth is eleven days short of the actual year, it would only be necessary to add these eleven days to the end of the year or distribute them among the months. This suggestion is really foolish. It would put the month out of step with the moon; and what use would a lunar calendar be in that case? It must be borne in mind that a calendar must go absolutely by the moon or absolutely by the sun, else it will run completely astray and be no calendar at all. The ancients managed very cleverly so far as the moon was concerned. A complete lunation is approximately 29½ days. Their months therefore had twenty-nine and thirty days alternately. By following this rule strictly they struck an average that kept in close step with the moon and only needed a day thrown in at long intervals to correct the slight error. This was the practice of the Greeks. The problem was to find a way to correct this calendar to correspond with the annual journey of the sun and yet not get out of step with the moon. They could have lunar months which rambled through the seasons in a most confusing way, or they could have a year which was fairly true to the sun, but with months that had no relation to the moon. And it is not in human nature to be satisfied with either.

It was a great day in the history of humanity when the astronomer Meton, of Athens, made his observation that once in nineteen years the sun and moon come round to the same relative position in the heavens. This means that the new moon, or any other phase of the moon, falls upon the same time or season that it did nineteen years before.

Here was an astronomic fact that was due to be taken advantage of. In this total time of nineteen years he counted just 235 lunations. This was a happy coincidence for the purpose of a lunar calendar. At last it was found that the sun does do something, complete, in exactly the same time that it takes the moon to do it. As a matter of fact, the 235 lunations take nineteen years and two hours; but the coincidence was sufficient for the purpose.

The problem had always been to get the moon into step with the sun without breaking a month to do it, and thus getting out of step with the moon. And when it is noted that any certain number of lunations equals any certain number of solar years, the problem is on its way to solution.

The period consisted of 6940 days. All that remained was to divide this period into years of twelve and thirteen lunar months. As twelve lunar months are less than a solar year, and thirteen are in excess of a solar year, either one is approximately correct. And the problem was to mix these years in such proportion that their total would come out even with the luni-solar period. It was found that by having seven of these thirteen-month years, or leap years, distributed among the nineteen the proper total was made up. Through all these years, whether of twelve or thirteen months, the moon was strictly followed by the alternation of twenty-nine-day and thirty-day months, except at intervals when an extra thirty-day month was used by way of correction.

To the modern mind such years would be far from satisfactory; for twelve of them in each nineteen-year

period had 354 days, while the seven leap years had 384 days, due to the extra thirty-day month. But they were not trying to have solar years. This is a mathematical impossibility so long as you are observing lunar months. Their problem was simply to have a system of correction. on a true astronomical basis, which would hold them in an approximate relation to the sun and would keep their months from rotating through the seasons.

Heretofore a month had been but an uncertain craft for a man to trust himself to upon the sea of time. It had a way of floating clean off its bearing so that man and month were lost together. And when the date belied the season there was no certain and set formula to bring them into some recognized relation again. But this nineteen-year coincidence—a recurring basis of correction—was like having a row of stakes driven for you all across the blue of eternity. It was only necessary to figure out a formula for getting from one to the other; and this was done by having the thirteen-month years to hold the months and the seasons in approximate relation till the nineteen-year goal was reached. After that the formula could be repeated, and the problem was solved forever!

This calendar, a memorable invention, was made public at the Olympic games on July 16 of the year 432 B.C and acclaimed by the people. Thereafter the number of each year, from one to nineteen, was engraved "on pillars of marble in letters of gold", and in church calendars after the beginning of the Christian era the Metonic number of each year was printed in golden ink. It is the same Golden Number which we find in the modern prayer-book in connection with the rule for finding the date of Easter. The calendar-maker could hardly get along without it.

The Jewish calendar is essentially the same as this old Greek calendar, being based upon the Metonic cycle and the alternating months of twenty-nine and thirty

days. It differs a little in the management of the leap years and common years, there being three lengths of each; but the end attained and the principle are the same. The Mohammedans cling to it religiously.

The Romans, if they had strictly observed the rules of the Metonic calendar, instead of altering figures upon the basis of superstition, would no doubt have found it fairly satisfactory. But they made a complete mess of it; and Julius Cæsar solved the problem by adopting the Egyptian method, which makes the sun the standard. When this was done the moon was cast utterly aside—necessarily. A solar calendar cannot serve two masters.

In establishing the solar calendar Cæsar took advice from the astronomers at Alexandria and made the length of the year 365¼ days, which is slightly in excess of the true period. In 1582 the error of about eleven minutes per year had accumulated until it amounted to ten days. This shifting of the date away from the season became undesirable because it brought Easter and all the other movable festivals at a wrong time. Pope Gregory XIII corrected it, making the fifth of October the fifteenth, 1582. And in order that the error might not grow to such size again he ordained that every year of even hundreds should not be counted a leap year, excepting every four-hundredth, beginning with the year 2000. In Catholic countries the change was promptly adopted; but in the Protestant world the people refused to take advice from the Pope even though he was dealing with a mere matter of arithmetic. It was not till 1751, after nearly two centuries of inconvenience, that Great Britain and her dependencies gave in. By that time the error was eleven days; and September 3, 1752, was called September 14.

Viewing our present proposals for calendar reform in the light of history, we cannot but be struck by the fact that there is no call for astronomical correction. Our scheme of time measurement, substantially the same as it was in the year 45 B.C., and only slightly corrected in 1582, is astronomically perfect.

When Julius Cæsar made months of thirty-one days purely upon a basis of superstition, it really was no great matter from a scientific standpoint. The month was no longer an astronomical unit; the moon had utterly passed out as a standard of measurement. Of our present proposed plans, that known as the Astronomer's has great standing in Europe; and that has a thirty-one-day month in every quarter. Its advantage over the present calendar is that a difference of from one to two days in the lengths of the quarter-years is done away with; and that is all. It is a difference which would probably be taken account of by statisticians or in certain business transactions. While many of the features of calendar reform win our assent at once, we scarcely know what attitude to take when we find the continuity of the week broken into and our relations with the past again put out of joint. The length of the month is of no importance astronomically; it is purely a matter of taste or business convenience. Astronomically the calendar is perfect; and it was made so by astronomers who had no observatories in the modern sense, and who made all their discoveries with the naked eye.

Of the great naked-eye astronomers I hardly know whether to give my admiration to Meton, who made the moon practical for human use, or to Hipparchus or to Copernicus. Meton was very useful to the world, but beyond his connection with the lunar calendar we know little about him. Hipparchus, who lived in the second century before Christ, was the first of whom we have reliable record; and he is accounted the founder of scientific astronomy. He explained the precession of the equinoxes, and was the first to discover from direct observation of the sun that the length of the year is somewhat less than 365¼ days. Copernicus was of the modern speculative type, which strikes out and concerns itself with God's own business. Purely in his mind's eye, and with no proof beyond appearances that were open to all,

he saw a world-machine which, as was proved by later discovery, was very much like one which God Himself had invented.

The astronomers who helped Gregory XIII to correct the system of leap years in 1582, when Shakespeare and Cervantes were living and Luther had not long been dead, had no notion of such a thing as a telescope. Their only lenses were the ones God gave them; and so it was with all the great astronomers who lived and died before them. Consider well, then, the calendar on the wall. It came down to us, just as it is, from the days of paganism! It owes little to modern astronomy and nothing whatever to the telescope. And, except for the fact that Cæsar did not start it on the day of the winter solstice, it is astronomically perfect!

BRIEF CHRONOLOGY OF CALENDAR PERIODS AND REFORM MOVEMENTS[2]

7000 B.C.—Civilization in Egypt traced to this date. Use of calendar presumed.

4713 B.C.—January 1 of this year was set by Joseph Scaliger as the beginning of the Julian Period.

4235 to 2450 B.C.—The Great Pyramid at Gizeh near Cairo was built. Its structure is said to indicate it was built to throw shadows for the testing of chronology by tracing the sun's movements.

4004 B.C.—The date of the Creation, as assumed by the chronology of Bishop Usher of England.

3761 B.C.—The date of the Creation as assumed by the Jewish calendar.

3102 B.C.—The supposed beginning of the account of time in India. This date is fixed as the beginning of what is known as the Kaliyug Era.

[2] From Article Brief Chronology of Calendar Periods. *Congressional Digest*. 8:97-8. April, 1929, with additions from the National Committee on Calendar Simplification and other sources.

2397 B.C.—The supposed beginning of the account of time in China.

776 B.C.—The supposed beginning of the Era of the Olympiads.

754 B.C.—The Romans were operating under a year of 304 days.

753 B.C.—The Era of Rome began. The letters A.U.C. were used to indicate this period, meaning *anno urbis conditae* or the year of the founding of the City of Rome.

509 B.C.—The Roman year had grown to 12 months totaling 354 days, with a biennial addition of 21 days, making 1460 days in 4 years or an average of 365 days per year. This 21 day adjustment, Mr. M. B. Cotsworth states, is identical with the old Druidical "quarter moon" adjustment.

432 B. C.—Meton, a Greek, discovered that 19 solar years contained 235 lunations. The Greek year at that period was a lunar twelve-month of 354 days.

238 B. C.—Reforms in the Egyptian calendar were made in Rome.

45 B. C.—Julius Caesar put the Julian calendar into effect in Rome. The name of the month Quintilis was changed to July in honor of Julius Caesar.

8 B. C.—Augustus Caesar persuaded the Roman Senate to change the name of the month Sextilis to August, in his own honor.

312 A. D.—The Emperor Constantine of Rome abolished the Olympiads and established in their stead the Indictions, or Cycles of 15 years, intended to be employed in connection with public accounts and the collection of imperial taxes. On January 1, the Roman Indiction went into effect.

325 A. D.—The General Council of Nicia (Nice, Italy) was held.

358 A. D.—Rabbi Hillel II made an adjustment in the Jewish calendar.

532 A. D.—The Christian Era was invented by a monk, Dionysius Exiguus. It is held to have begun on January 1, in the middle of the 4th year of the 194th Olympiad; the 753rd year of the building of Rome and in 4714 of the Julian Period. The Christian Era was introduced in Italy some time in the 6th Century.

816 A. D.—The Christian Era was ordered to be used by Bishops of the Council of Chelsea but was not generally used until several centuries later.

879 A. D.—King Charles III of Germany was the first to add "In the year of Our Lord" to the date of his reign.

1454 A. D.—The Council of Trent was held.

1577 A. D.—Pope Gregory XIII appointed a commission to study a plan of calendar reform designed by a Neapolitan physician, Aloysius Lilius.

1582 A. D.—The new calendar known as the Gregorian calendar, was first put into effect in four countries —Italy, Spain, Portugal and France.

1583 A. D.—Switzerland and the Catholic Netherlands adopted the Gregorian calendar.

1609 A. D.—The Protestant States of Germany adopted the Gregorian calendar.

1751 A. D.—The Calendar New Style Act was passed by the British Parliament. It was introduced by Lord Chesterfield.

1752 A. D.—The Calendar New Style Act came into effect, resulting in the adoption of the Gregorian calendar by Great Britain and all her colonies including the American Colonies. Prior to this the 25th of March had been the beginning of New Year in Great Britain.

1793 A. D.—On November 24, the Revolutionary calendar of the French Convention was instituted. This calendar made September 22 the beginning of the year in commemoration of the founding of the French Republic, September 22, 1792. This year had 12 months of 30 days each, with five supernumerary days at the end of

each year. Weeks were abolished and the months divided into three decades of 10 days each.

1804—On December 31, the French Revolutionary calendar was abandoned.

1835 A. D.—An Italian priest, l'abbe Marc Mastrofini, published in Rome a proposal to reform the calendar by having every year begin on Sunday, with the last day of the year having no week day name.

1849—August Compte, a Frenchman, proposed a calendar of 13 months of 28 days each, with blank days. This day was to be observed as an 8th day feast. Leap day was to be called the intercalary day. It was the first known proposal to use "blank" days to establish a perpetual calendar. The book bore three ecclesiastical sanctions of the Roman Catholic Church.

1873—Gregorian calendar adopted by Japan.

1900—Calendar improvement brought before the Evangelical Conference at Eisenach .

1908—A bill was introduced in the British Parliament to reform the Gregorian calendar.

1910—In June a Congress of European Chambers of Commerce, meeting in London, recommended the calling of an international convention. These same recommendations were adopted at similar meetings in Boston in 1912 and at Petrograd in 1913.

1912—Gregorian calendar adopted by the Chinese Republic.

1914—A second bill for calendar reformation was introduced in the British Parliament. Commercial associations meeting in Paris and Liege recommended a 13 month calendar.

1917—American business men began organizing for calendar reform, advocating the Liberty calendar.

1917—Gregorian calendar adopted by the Turkish Parliament.

1918—Bolshevist government of Russia adopted the Gregorian calendar.

1918—On April 16, Representative J. M. C. Smith introduced a bill (H. R. 11486, 65th Cong. 2nd Sess.) which provided that beginning with the year 1920 each year should have 13 months of four weeks each or 28 days, the added month to be called Sol (from Solstice) and to follow June. This bill was referred to the Committee on Interstate and Foreign Commerce but no action was taken.

1919—The International Astronomical Union appointed a committee to study calendar reform.

1921—On May 12 Representative Drane introduced in the House a bill (H.R. 6166) to change the calendar from the Gregorian to a perpetual calendar establishing 13 months instead of 12. It was referred to the Committee on the Judiciary.

1922—The Chamber of Commerce of the United States and the American section of the International Chamber of Commerce began consideration of the question of simplifying the calendar with the result that the International Chamber requested the League of Nations to take up the question.

1922—The Congress of the International Astronomical Union met at Rome.

1922—On February 9 there was a hearing on a bill (H.R. 3178, 67th Cong., 2nd Sess.) before the Committee of the Judiciary relating to the modification of the calendar.

1922—On March 6, Representative A. Piatt Andrew introduced in the House by request a bill (H.R. 10741, 67th Cong., 2nd Sess.) to eliminate from our Julian calendar all numbers in it prompted by the pride of Augustus and to incorporate in their places the original uniform numbers written by Caius Julius and enacted by the Roman Senate. This bill was referred to the Committee on the Judiciary but no action was taken.

1922—On June 29, Representative Schall introduced a bill (H.R. 12221, 67th Cong. 2nd Sess.) authorizing the

President to call an international conference to improve the Gregorian calendar and to recommend, for universal adoption, a common calendar to be used in the reckoning of calendar dates and in regulation of time throughout the world.

1923—Greece and the Greek Church adopt the Gregorian calendar.

1923—The League of Nations appointed a Committee of Inquiry on Calendar Simplification. This Committee analyzed 185 proposals from 38 nations and filed a comprehensive report to the League.

1924—The Assembly of the Geodesic and Geophysical Union at Madrid.

1924—On January 7, Representative Schall introduced a bill (H. R. 4847, 68th Cong., 1st Sess.) to provide for the adoption of the Liberty calendar. This bill was referred to the Committee on the Judiciary but no action was taken.

1926—On September 26, the Assembly of the League of Nations accepted the findings of the Committee of Inquiry.

1927—On September 27 the Secretary General of the League of Nations transmitted to the nations, including the United States, a request for the establishment of national committees to study and report on calendar reform. The Secretary of State thereupon requested an expression of opinion from the various government departments and found their sentiment was favorable toward calendar change and the formation of a national committee.

1928—On January 27 a bill (S. 2862, 70th Congress, 1st Sess.) providing for the modification of the calendar to the Liberty calendar was introduced into the Senate by Mr. Schall and referred to the Committee on the Judiciary.

1928—On February 18 the Pan American Conference at Havana adopted a resolution recommending that

each of the Latin-American states appoint a national committee to study the question of calendar simplification, and that they make the necessary preparation to participate in an international conference to determine which is the best method of reform.

1928—On February 23 the National Academy of Sciences, Washington, D.C. adopted a resolution in favor of a change to the thirteen month calendar.

1928—On July 9 the National Committee on Calendar Simplification was organized at Washington, D.C. Although not an official organization it had representatives from the Federal departments of the Treasury, Navy, Interior, Agriculture, Commerce, Labor, Interstate Commerce Commission, as well as from industrial, business and civil interests.

1928. On December 3 and 5 two joint resolutions (H.J. Res. 330 and H.J Res. 334, 70th Cong., 2nd Sess.) were introduced by Representative Stephen G. Porter, and one (S.J. Res. 173) was introduced by Senator Thomas D. Schall, intended to give effect to the Pan American resolution. Hearings were held in December and January before the House Committee on Foreign Affairs, but no action was taken.

1929—On April 15 and 29 two resolutions (H.J. Res. 16 and H.J. Res. 60) were introduced into the House by Representative Stephen G. Porter requesting the President to propose the calling of an international conference to consider the simplification of the calendar or to accept in behalf of the United States an invitation to participate in such a conference.

LEAGUE OF NATIONS' REPORT [8]

Before submitting its conclusions, the Committee feels that it should point out the main, and undisputed, defects of the present Gregorian calendar, *i.e.*:

[8] From League of Nations. Special Committee of Enquiry into the Reform of the Calendar. Geneva. 1926.

1. Inequality in the Length of the Divisions of the Year.

The divisions of the year, the months, quarters, and half-years, are of unequal length. The months contain from 28 to 31 days. As a result, the number of days in the quarters are respectively 90 (91 in a leap year), 91, 92, and 92. The first half-year, therefore, contains two or three days less than the second. Another result is the unequal number of weeks included in the quarters and half-years.

The unequal length of months, quarters, and half-years is a cause of confusion and uncertainty in economic relations, in the arrangement of all statistics, accounts, commercial and transport figures, &c.

The fact that the months contain 28, 29, 30, or 31 days is responsible for the fact that all calculations of salaries, interest, insurance, pensions, leases and rent which are fixed on a monthly, quarterly, or half-yearly basis are inaccurate and do not correspond with one-twelfth, one-quarter or half of the year. In order to make daily calculations in current accounts with comparative certainty and speed, banks are obliged to make constant use of special tables. Moreover, in most of the countries of Europe, the unequal length of the months has led financial concerns to calculate deposit and current accounts on the basis of a year of twelve months of thirty days, or a year of 360 days, whereas in the discounting of bills the year is still reckoned at its exact number of days. Finally, the quarters and half-years do not contain an exact number of weeks.

2. Want of Fixity in the Calendar.

The calendar is not fixed: it changes each year; the year, in fact, consists of 52 weeks, plus one or two days. Thus, if the first day of the year is a Sunday, in the following year it is a Monday (or even a Tuesday in the

case of a leap year). Were it not for the extra day of leap year the calendar would only have seven different alternatives corresponding to the seven days of the week on which the year can begin; owing, however, to the extra day of the leap year, the exact *reproduction* of the calendar of any year only takes place once every 28 years. Thus, the day of the month falls each year on a different day of the week from the one on which it fell the previous year. In consequence:—

(*a*) The dates of periodical events can never be fixed with precision. Such a date can, in fact, only be determined in two ways: either by the day of the month (August 15th for example) or by the day of the week in the month (the third Tuesday in October). With the present Gregorian calendar, this double method is not precise, for, if the day of the month is fixed for periodical events, this day may sometimes fall on a Sunday or general holiday.

Each year, therefore, the authorities have to make a special decision, as for instance, for the meeting of a tribunal, the convocation of Parliament, the dates of holidays, fairs, markets, administrative assemblies, the fixing of summer-time, &c.

On the other hand, if a special day (the first Monday in the month, for example) is fixed for these events, other difficulties arise, as the date corresponding to this day varies continually from month to month and from year to year.

If the calendar were fixed, the dates of these events could be fixed once for all. They would fall on the same dates as well as on the same days of the week.

(*b*) The position of the weeks in the quarters varies each year, that is to say, the weeks overlap the divisions of a year in a different way each time, and complications accordingly arise in the reckoning of accounts, statistics, &c.

(*c*) The 1st, 15th, and 30th of a month are sometimes Sundays. When the 1st of a month falls on a Sunday, it is not possible to revise and verify immediately all the work of the previous months and quarters and to establish without delay the various comparisons which are essential from a business point of view. This is a serious disadvantage in respect of accounts and statistics. The 15th and 30th of the month are very important dates as regards the falling due and the payment of rents. When these dates are Sundays, the payments must be postponed or advanced.

(*d*) Finally—and this is, perhaps, the greatest drawback from a statistical and commercial point—since the various days of the week are not of the same value as regards the volume of trade, and the years and the months do not from year to year include the same number of individual week-days, there can be no genuine statistical comparison between one year and another, while the various subdivisions of the year itself—the half-years, quarters, and months—are likewise incapable of comparison.

3. Special Disadvantages of the Non-Fixity of Easter.

The date of Easter varies at present between March 22nd and April 25th, *i.e.*, over a period of 35 days, and involves a corresponding displacement of the movable festivals. Numerous disadvantages result, both from a civil and a religious point of view. In the civil sphere, school, university, and judicial work, and commercial interests, including those relating to transport, are particularly affected. The beginning of the scholastic year and some of its holidays are fixed, whereas others are movable. The same disadvantages apply to judicial or administrative holidays. Many commercial transactions and the transport services connected with them are severely prejudiced by the changing date of Easter: in particular, business dealing with textiles, articles of

fashion, and the hotel-keeping industry, since Easter marks the beginning of the spring fashions and is an important date from the tourist point of view. If Easter is early, the weather of the Northern Hemisphere being unfavourable in the temperate zones at this time of the year, travelling and changes in dress are postponed. If, on the other hand, Easter is late, there is more tourist business, but the textile trade in spring wear is severely injured, because summer articles are purchased at once. In a general way the organisation of traffic and transport is disturbed by the changing date of Easter. From the religious point of view, there are disadvantages due to the fact that the number of Sundays in the year being practically fixed, the services of the Roman Catholic liturgy which cannot take place before Easter when this festival is early have to be postponed until after Whitsuntide.

As stated above, the Committee found itself obliged to separate the question of the fixing of Easter from that of the general reform of the calendar, and it will adhere to this policy in its report, submitting its conclusions on these two points separately.

General Reform of the Calendar

The Committee has received a considerable number of schemes for the reform of the calendar from various sources in numerous countries. The number of these schemes shows the keen interest which the question of calendar reform is arousing throughout the world. It does not seem necessary to give, in the report itself, a detailed classification of these schemes. They are, however, analysed, the analysis being preceded by a general classification. It may be of interest to note that the schemes submitted were received from the following countries:

Algeria 1, Argentine 2, Austria 7, Belgium 10, Brazil 2, Canada 4, Chile 1, China 1, Danzig 1, Denmark 1,

Egypt 1, Esthonia 1, France 33, Germany 24, Great Britain 5, Greece 3, Hungary 3, India 3, Ireland 1, Italy 5, Java 1, Netherlands 5, Norway 1, Poland 3, Roumania 10, Kingdom of the Serbs, Croats, and Slovenes 3, Spain 3, Switzerland 14, Syria 1, Tunis 1, Turkey 1, United States of America 27, Uruguay 11.

There was also one international proposal.

In the course of the enquiry, consideration was also given to a number of schemes already known to the Committee.

The total number of schemes received was 185. The Committee noted, after examining the last hundred received, that, although each had been conceived by its author on an original basis, none offered any new combination that could reasonably be put into practice. The Committee consequently concluded that the material was complete, and that all combinations which can be carried out with any hope of success are known to the Committee.

Of course, if every one of these draft schemes had to be discussed, there would be little likelihood of securing a result. After collecting the necessary information and obtaining preliminary opinions from the various governments and international associations interested, the Committee concluded that one of its duties was to restrict the problem by eliminating all main groups of reform schemes which seemed useless and impracticable, when judged on their intrinsic merits and the possibility of their acceptance by the public.

The Committee came to the conclusion that it could not recommend the following groups of changes and schemes of reform:—

1. Modifications of the Year proposed by Certain Authors of Calendar Reform Schemes.

(*a*) *Beginning of the year.* The Committee was of opinion that it could not recommend any reform designed

to make the year open on December 22nd in place of January 1st, since the undeniable advantage of the civil year practically coinciding with the astronomical year as reckoned from the winter solstice certainly would not compensate in most peoples' opinion for the very serious disadvantages inseparable from the change, *i.e.*, the confusion inevitably created by dropping ten days. This confusion would be specially felt in those countries which had very recently adopted the Gregorian calendar. In addition, the year in which these ten days were dropped would be of no value whatever for the comparison of statistics of any kind, and particularly statistics relating to economic and social life.

(*b*) *Length of the year.* The Committee was of the opinion that it could not recommend any alteration in the length of the year as fixed by the Gregorian calendar, which in its present form, with the arrangement made for leap years, was sufficiently accurate for all practical purposes. The Committee accordingly was unable to consider the suggestions made in certain reform plans to modify the Gregorian method of fixing leap year, nor could it accept various proposals to establish a "normal" year consisting of a complete number of weeks, a change which would involve the addition from time to time of a "leap" week or month. The recurrence of years differing considerably in length from the "normal" year would give rise to very serious difficulties, particularly as regards fixing religious festivals, the possibility of comparing annual statistics and various observances connected with family life (birthdays and anniversaries).

2. Division of the Year into Months of considerably Different Length.

The Committee felt that it could not recommend the solution proposed in certain reform schemes, namely, the division of the year into eight months of 28 days and four months of 35 days, because the very perceptible inequal-

ity of the months would be extremely inconvenient from every point of view, and particularly as regards monthly salaries and monthly payments. Moreover, a comparison of monthly statistics would become extremely complicated.

3. Alteration in the Name of the Months.

The Committee considered that such a change, though in some respects strictly logical, would arouse considerable opposition, and would not be of sufficient practical utility.

Now that the above proposals have been eliminated, the Committee feels that the attention of the public, on whose approval any reform of the calendar must depend, should be directed exclusively (in order that it may understand their respective advantages and disadvantages) to the fundamental principles of three main groups of reform, leaving aside the details of any particular scheme in any one group.

The first of these groups consists of those schemes the object of which is to simplify the reform as far as possible and cause the least possible disturbance to existing habits and customs by equalizing the quarters. In this group of proposals, each quarter consists of two months of 30 days and one month of 31 days, while one quarter contains an additional day. There is no blank day (outside the week). Such levelling-up of the quarters would be of real advantage from the point of view of quarterly statistics, such as summaries of stock exchange transactions, banking accounts, &c., and as regards the comparability of meteorological statistics and averages. It would also simplify calculations for ascertaining the day of the week on which any given date falls. If, for instance, it were decided that each quarter should consist of two months of 30 days and one month of 31 days, there would be a fairly simple relation between the day of the week and the date of the month. It would merely be necessary to remember on what day

of the week January 1st fell; if it were a Sunday, the first of February would be a Tuesday, the first of March a Thursday, and so on. In the following quarter the rule would be the same; if April 1st were a Sunday, May 1st would be a Tuesday and June 1st a Thursday. This simplification would be due to the fact that 30, 30, and 31 days make exactly 13 weeks. Another reform on these lines has been proposed which is less perfect, but even more simple. The suggestion is to abolish the 31st day of August and add one day at the end of February of the following year.

This group of schemes interferes with tradition less than any of the others. It evokes no objections on religious grounds, and its disadvantages are merely those which are inherent in every variety of reform. The only problem raised—and it is one which has been referred to in various replies received during the enquiry is whether its advantages, which are considerably less than those of other reform schemes, are sufficient to justify the change.

The "Blank-day" Principle.

The other two main groups are characterised by the presence of a blank day in ordinary years, and two blank days in leap years. One of these groups involves twelve months (some months with 30 days and others with 31), while the other contemplates 13 months of 28 days. Unlike the first of the main groups under consideration, the two latter establish a perpetual calendar and completely rectify the variability of the existing calendar. They also possess all the advantages of the first main group in the way of equalising the divisions of the year. Against their common advantages must be set certain disadvantages which they also possess in common, and from which the first group is practically, if not entirely, immune; we refer to certain religious difficulties, arising mainly in Protestant and Jewish circles, in connection with the introduction of the blank day, which breaks the

perpetuity of the cycle of weeks (*cf.* one of the documents communicated during the enquiry). Finally, greater disturbance is caused in existing habits and customs.

In addition to these common advantages and disadvantages, the two groups of twelve and thirteen months also possess the following individual advantages and disadvantages:—

TWELVE MONTHS (8 MONTHS OF 30 DAYS, 4 MONTHS OF 31 DAYS).

Advantages

1. Half-years and quarters have a full number of months and weeks
2. Every month can contain the same number of working days. (See (*d*) on page 66.

Disadvantages

1. The months are not of the same length.
2. The months do not contain a complete number of weeks.
3. The dates do not fall on the same day of the week in each month.
4. The comparison of future dates with past dates and the comparison of future statistics with past statistics is less complicated than in the 13-month group, but more complicated than in the group which merely regularises the quarters.

THIRTEEN MONTHS OF 28 DAYS.

Advantages

1. The months all have the same number of days.
2. The periods for which salaries are calculated exactly correspond to the periods of expenditure.
3. The fact that the months are all of the same length has great advantages from the point of view of monthly statistics.
4. Each month contains the same whole number of weeks.

Disadvantages.

1. The figure 13 is not divisible by 2, 3, 4, or 6.
2. The quarters of the year (of equal length) do not contain a whole number of months.
3. The introduction of a year of 13 months implies a considerable change in customs which have been established for many thousands of years.
4. In general, a greater number of corrections would be required in drawing up statistics than with the 12 months system.

Generally speaking, and considering only the intrinsic value of the last two main groups, the thirteen-month system would seem to be of greater utility from the point of view of statistics and commerce, if the month, rather than the quarter, is to be taken as the unit of economic life. The twelve-month system would be preferable in the other contingency. As regards the possibility of their practical application, the preliminary enquiry shows that

the various governments are more favourable to the 12-month system, which would cause less disturbance to established customs. Most commercial organisations seem to take the same view.

An increasing number, however, seem to favour the thirteen-month system, particularly those which are already using it as an auxiliary calendar—a point to which we shall refer later—and have been able to gauge its results.

The Committee does not at present see its way to pronounce in favour of any of the other groups. The question of the reform of the calendar cannot be raised in the abstract and having regard exclusively to the theoretical advantages of one or other reform, but must be considered in relation to its practicability, and with the intention of adhering strictly to the views of the public and taking into consideration the extent to which public opinion has been educated on this subject. No reform can be effected without the consent of all, or almost all, the important bodies interested, and these cover a wide range—religious, administrative, economic and scientific, for example. It rests with public opinion, as here defined, to judge of the merits and the practicability of each of these groups of systems. The Committee does not, however, believe that it has as yet been possible to obtain sufficiently definite statements of the final views of those interested.

The Committee, after examining the results of its various enquiries, gained the clear impression that, although a great number of people in many countries had shown great interest in the question, and although powerful propaganda movements were on foot, it was nevertheless a fact that public opinion was not yet prepared, even if it welcomed reform, to press for immediate action in a particular direction. An international conference for the conclusion of a convention for effecting reform, after agreement with the high religious authorities

in cases in which reform would require such agreement, would have no chance of success unless that degree of preparation of public opinion had been reached. Up to now the preparation of opinion has been carried out in the bodies interested—without sufficient concentration on the principles involved—and rather in connection with definite systems and under the influences of organisations engaged in propaganda in favour of such systems to the exclusion of others—and further without any co-ordination within each country of the views of the different bodies concerned.

The replies received from the various governments clearly show that most governments have only consulted certain scientific bodies. They most probably felt that they had not sufficient data to allow of their submitting the views of all the classes of the population who would be affected by the reform.

The Committee now submits to public opinion the elements of a definite plan of work, together with adequate information thereon. The necessary eliminations have been made. The plan to be laid before the public necessarily follows the general explanations which have been given of the respective advantages and difficulties of the three groups of systems. Enlightened and organised opinion in each country should concentrate upon a clear understanding of the principles involved, which alone will enable us, when the time comes, to choose among the different groups of systems. There should, in particular, be a fresh examination by the opposing religious bodies of the principle of a blank day, by discussion on this subject in each country between religious bodies and others interested in the matter, an examination by statisticians and economists of the relative importance of the three-monthly period and of the week as units of economic life in opposition to the month, with a view to determining the choice between a twelve-month and a thirteen-month calendar and a definition of the advantages of a limited measure of reform.

It is also essential that the investigations in this direction by those interested should be co-ordinated and organised in each country on official or semi-official lines. An organisation of this kind would make it possible to form in the leading countries that body of public opinion which is at present lacking, and without which it would be premature to try to establish any international agreement. It would also, in most countries, help forward the work of education which the large propaganda associations will have to do, and their disinterested assistance is absolutely necessary for the success of so difficult an undertaking as that of calendar reform. The task will be made lighter if these associations encourage a free discussion of principles, and avoid taking sides too early in the day and advocating the adoption of any one scheme of reform in all its details.

It is not for the Committee to suggest any definite method of organisation. The competent authorities of the League might perhaps make such a suggestion, and consider how the League can keep itself regularly informed of the progress made. If, after a reasonable period has elapsed, it seems clear that it would be quite impossible, in view of the state of public opinion, to attempt to establish a perpetual calendar on the lines of the two latter main groups, the League of Nations might perhaps propose the lesser reform represented by the systems in the first main group. For the present, the essential work would seem to be to prepare public opinion patiently, in conjunction with the League of Nations, so that when the right time comes—that is to say, when it is seen that the preliminary conditions for agreement exist in every country—the League may consider what steps should be taken to secure an international agreement.

The Committee feels that it cannot terminate this statement of its conclusions regarding the general reform of the calendar without referring to the question of the auxiliary calendar. This is, of course, a calendar used

by private organisations for their own requirements in connection with accountancy, the payment of staff, &c., instead of the official one generally employed. From the information received it appears that a large number of important organisations (British railways and many American organisations) have already adopted various systems of auxiliary perpetual calendars, in particular auxiliary calendars based on the 13 months of 28 days system.

These facts are of interest because they prove that the disadvantages of the present calendar have been felt in actual practice—so much so, indeed, that in certain economic spheres, another form of calendar is being used in place of the present one. The Committee does not wish to lay undue stress on this point, which may lie outside its main duties; but it feels that the experiment deserves mention, and should, indeed, be followed with sympathetic interest, because it is helping to educate public opinion on the possibility of calendar reform, and is also making it possible to gauge, in practice and without further delay. the value of certain factors in the general reform.

Stabilisation of Easter

In the replies which the Committee has received to its enquiries, the expressions "fixing" and "stabilisation" of Easter have been used as interchangeable terms. Naturally, if the question of Easter is separated from that of the general reform of the calendar, or to be more accurate, that of establishing a perpetual calendar, the expression "stabilisation" is the only correct term, because, if the calendar is not perpetual, and if, as almost all authorities agree in thinking, Easter must fall on a Sunday, its date will unavoidably oscillate within a seven-day period. The problem is, therefore, one of reducing the extreme variations in the date of Easter—to which we have re-

ferred at the beginning of this report—not by fixing Easter on a given date, but on a given Sunday. With regard to the stabilisation of Easter, the Committee feels that its enquiries warrant the drawing of certain very definite conclusions.

In a former letter to the Advisory and Technical Committee (dated February 16th, 1925) the Committee of Enquiry pointed out that the stabilisation of Easter is a reform on which, when the time comes for its application, the Christian religious committees will in the first place have to give their opinion and now, at the end of its work, the Committee wishes to reiterate this statement. Similarly, the Committee desires at this preliminary stage of the quesion, to indicate broadly the attitude of the various supreme religious authorities, as defined by themselves. The details of these replies will be found in the different Annexes.

In a letter dated March 7th, 1924, from the Apostolic Nuncio at Berne, the Holy See stated that any changes which might be made in regard to the fixing of Easter, though they would meet with no objections from the point of view of dogma, would nevertheless involve the abandonment of deeply rooted traditions from which it would be neither legitimate nor desirable to depart, except for weighty reasons of universal interest; the Holy See added that it did not see any sufficient reason for changing what had been the perpetual usage of the Church, handed down by immemorial tradition and sanctioned by the Councils from early times. Even if, therefore, it were shown that some change in these traditions were desirable for the good of mankind, the Holy See would not be prepared to consider the question except on the advice of the forthcoming Œcumenical Council.

In a letter dated February 18th, 1924, from His Holiness the Œcumenical Patriarch Gregory of Constantinople, the Committee was informed that the Pan-Orthodox Congress had decided, at its meetings of May 23rd and

June 5th, 1923, that the Orthodox Church was prepared, if all Christian Churches were in agreement, to pronounce in favour of the stabilisation of Easter.

By decision of the Convocation of the Anglican Church, dated April 28th, 1925, this Church has expressed its opinion:—

(1) That there is no dogmatic reason why the Church should oppose a fixed date for Easter, but the Church of England could not consent to the proposed change unless it was accepted by the other Christian Communions.

(2) That if a fixed Easter were adopted, April should be assigned for the Festival, which should fall on a Sunday, approximately midway between the present limits of variation.

(3) That it is important to take into account the whole sequence of the Church's Year in considering any proposals for fixing Easter, and particularly for any general reconstruction of the Calendar.

As regards the denominations not represented in the Committee, the Federal Council of the Churches of Christ in America, in a resolution of its Committee expressed its sincere interest in the efforts of the League of Nations to secure a universal agreement upon a fixed day for Easter Day. In a letter dated February 27th, 1924, the Committee of the Evangelical Churches of Germany stated that these churches would raise no objection in principle to the stabilisation of Easter, and would readily agree to such a measure provided it were the result of general agreement.

In a letter dated February 16th, 1924, the Council of the Federation of Swiss Protestant Churches stated that it regards the fixing of the date of Easter as the most urgent and most important reform of all.

Finally, on February 16, 1925, Dr. Keller appeared before the Committee as delegate of 82 Protestant Churches and Federations of Churches in America, Austria, Belgium, Czecho-Slovakia, Denmark, France, Germany, Great Britain, Netherlands, Hungary, Italy, Lithuania, Norway, Poland, Roumania, Spain, Sweden, and Switzerland (including some of those whose opinion

has been given above) and stated that, as there was not yet any central organisation, it had not been possible to ascertain the opinion of all the numerous single Churches, but he did not think that the communities which he represented saw any difficulty or disadvantages in stabilising Easter. He pointed out that the Council of the Swedish Evangelical Bishop and some British Churches were not sympathetic to any reform, but, nevertheless, no Protestant Church would oppose a reform which would serve the good of humanity.

The non-Christian religious communities do not seem to be directly concerned in the question, and they have only been consulted incidentally.

The Jewish communities who were represented at the meeting of the Committee on February 16th, 1925, stated that they had no objection to the stabilisation of Easter.

As the Committee has already pointed out in a letter to the Advisory and Technical Committee, most of the Christian Churches have declared themselves disposed to accept the stabilisation of Easter, on condition that the measures are adopted by the various Churches simultaneously. The Holy See has indeed stated that it does not think it possible, except for the most weighty reasons, to interfere with the religious tradition of centuries; but it has declared that, if it can be shown that the fixing of the festival of Easter would be of universal benefit, it would submit the question to the next Œcumenical Council.

The Committee, therefore, being aware from the outset that no fundamental objections would be raised by any supreme religious authority, and having noted, from the letters received, that probably all the religious authorities, in spite of the difficulties mentioned by some of them, would be ready to consider the stabilisation of Easter, if the benefit to mankind of such a reform could be clearly defined and proved, has endeavoured, by

means of a special enquiry, to ascertain the opinion of the non-religious circles concerned.

The disadvantages of the variability of Easter, which have been pointed out, are felt by the general public mainly in connection with trade and travel, and in the interference with the absolute regularity of the scholastic year.

The Committee consulted commercial interests through the International Chamber of Commerce. The reply of the International Chamber of Commerce is published *in extenso* (*see* Annex II, B. 1).

In March, 1923, the International Chamber of Commerce, at its Rome Congress, adopted the following resolution:—

> Whereas the desirability of fixing the date of Easter in the interests of all sections of the community has been repeatedly affirmed by Chambers of Commerce individually and collectively at various Congresses and Conferences for many years past.
>
> This Congress, adopting the resolution of the London Chamber of Commerce, recommends that:—
>
> The International Chamber of Commerce take all possible steps towards the accomplishment of this long-delayed reform.

In June, 1925, the Brussels Congress of the International Chamber of Commerce adopted the following resolution:—

> This Congress of the International Chamber of Commerce, having regard to the world-wide expression of opinion in favour of fixing the date of Easter, reaffirms the resolution adopted at the Second Congress in Rome, 1923, calling upon the International Chamber of Commerce to take all possible steps towards the accomplishment of this long-delayed reform.
>
> This Congress takes cognisance of the useful work already performed by the Chamber in pressing the question at the League of Nations and decides that the Chamber will renew its efforts in this and other directions, so that the resolution may be carried into effect at the earliest possible date.

At the request of the Committee, the International Chamber of Commerce asked its National Committees to supply further information and to this request the Committees of twelve countries replied. The replies received

from most of these countries, particularly the northern countries, show that the variability of Easter exercises an unfavourable influence on a number of industries, in particular the men and women's clothing, boot and shoe, leather, and tourist industries.

With regard to the effect of the variability of Easter on travel, the Committee has received information from two of the largest tourist agencies (*see* Annex II, B.3). This information shows that, although the advantages of any given fixed date for Easter would, from a general tourist point of view, differ to a certain extent according to countries, it may be said that a fixed date for Easter would nevertheless present certain advantages.

In its previous general enquiry, the Committee had also obtained information on this subject from all the railway administrations which are members of the International Railway Union (*see* Annex I.C.2). The railways of Germany, Esthonia, Spain, (Madrid, Saragossa, Alicante), France, Great Britain, Greece, Luxemburg, Hungary, Poland, Czecho-Slovakia, and Switzerland, and the Oriental Railways stated that they were in favour of the stabilisation of Easter.

Finally, the Committee took special pains to ascertain the opinion of the scholastic authorities in as many countries as possible. A circular on this subject was addressed to all the State Members of the League and to Germany. Twenty-three governments replied, no reply being unfavourable to the stabilisation of Easter. Certain governments replied that in their opinion the matter was not of practical interest; others stated that they had no objections to offer; but the vast majority of governments and competent educational authorities pronounced definitely in favour of the principle of stabilisation. Secondary educational authorities, in particular, were of opinion that the stabilisation of Easter would be of great advantage, because the school curricula could then be the same each year, and the various courses of lessons could

be more satisfactorily distributed throughout the year. Certain governments stated that they held the religious authorities to be alone competent to reach a decision on the principle of the date of Easter, and that, consequently, the opinion expressed by the educational authorities of their country was subject to the attitude which the religious authorities might eventually adopt.

The German government referred to a previous reply favourable to stabilisation, stating that, before giving its opinion, it consulted the various circles concerned, including the educational authorities. The proposal had been approved by the governments of all the German States, and consequently by all the German scholastic administrations.

The governments of Victoria and Queensland (Australia) were of opinion that it would be desirable to stabilise Easter, both from the point of view of school management and to make it possible to arrange school terms more satisfactorily than at present.

The Danish government stated that, although the question might not be of great importance to higher educational establishments, secondary school inspectors strongly recommended the fixing of Easter as being highly important from the point of view of school curricula and holidays.

The Esthonian Department of Public Instruction considered that, generally speaking, it would be highly desirable to solve the problem of the fixation of Easter. The Finnish Ministry of Public Instruction was of opinion that such stabilisation would considerably improve the regularity of the work in the various branches of education.

The French Ministry of Public Instruction stated that, in its opinion, the stabilisation of Easter would be entirely advantageous as the duration of the school terms would thus be equalised, with beneficial results to study. The French Ministry of War expressed the same opinion with regard to the curriculum of military schools.

In Great Britain, the Universities Bureau of the British Empire, the Secretary of the National Union of Teachers, the Chairman of the Joint Committee of the four Secondary Associations, the Executive Committee of the Association of Education Committees (England and Wales), the County Councils' Association, the Association of Directors and Secretaries for Education, the Association of Municipal Corporations and the Standing Committee of Vice-Chancellors and Principals of the Universities of Great Britain and Ireland, have all emphatically stated that they consider the fixing of Easter to be important from the point of view of a more satisfactory division of the school year.

The governments of Canada, Czecho-Slovakia, Greece, India, Liberia, Netherlands, New Zealand, Roumania, Sweden and Switzerland, have expressed the same views.

The Netherlands government stated that the fixing of Easter would, from a scholastic standpoint, present great advantages. The Director-General of Primary and Secondary Education in Sweden holds that it would be distinctly desirable to fix the date of Easter, and, consequently, that of Whitsuntide. In Switzerland, the Council of the Federal Polytechnical School has definitely pronounced in favour of the fixing of Easter.

The Committee does not feel called upon itself to draw any conclusions from these enquiries, which it has endeavoured to carry out on as definite lines as possible. It considers that it will be sufficient to offer a few observations with regard to the date on which Easter might be stabilised, though naturally this is a point which the supreme religious authorities must be left to consider after they have come to an agreement among themselves on the principle of stabilisation.

The Committee notes, however, that most of the replies received seem to favour the stabilisation of Easter on the second Sunday in April. The Committee would be prepared to accept this date. It would, however,

venture to suggest the possibility of a slight emendation: if Easter were fixed on the second Sunday in April it might fall on April 8th, in which case, the festival of the Annunciation (Lady-Day) and Passion Sunday would fall on the same day. In order to avoid this, the Committee might consider, in case the principle of stabilisation should be accepted, the following formula, which possesses the same practical advantages and obviates the difficulty referred to: Easter to be fixed on the Sunday following the second Saturday of April.

WEEK OR MONTH AS INTERMEDIATE TIME UNIT [4]

The suggestion of the week and the month as a subject for discussion before the Royal Statistical Society arises from two circumstances. The first is that, in the course of last year, the Chief of the United States Weather Bureau announced that the Bureau was in possession of observations of weather in the United States carried on systematically by automatic records, or eye-observations twice daily at least, for a period now nearing fifty years. The Bureau naturally wished to make up its mind as to the best method of grouping the observations for statistical purposes before embarking upon the vast task of presenting the results as a representation of the climates of the United States. The solution suggested by Dr. Marvin, the Chief of the Bureau, is to employ the week of seven days, extended to eight days for one week (or for two weeks in leap year) and to group the weeks into fortnights or "months" of four weeks.

The second circumstance is that the Ministry of Agriculture has recently taken up the systematic correlation of weather conditions with agricultural and horticultural results, and has appointed a committee to

[4] From paper by Sir Napier Shaw, Sc.D., F.R.S., before the Royal Statistical Society, May 19, 1925, *Royal Statistical Society. Journal.* 88:489-97. July, 1925.

organize the procedure. For that purpose the month has emerged automatically as the period of distribution of information to members of the committee; the information from the stations is collected month by month, but the meteorological data for districts are week by week.

On both sides of the Atlantic we are confronted therefore with the rival claims of the week and the month as the intermediate unit of time between the day and the year for statistical purposes and the subject is sufficiently important for statisticians to give some attention to it.

There is a further reason for taking up the subject at the present time; the constantly recurring agitation for the reform of the calendar has reached a stage when action may become possible through the influence of the League of Nations which has appointed a committee to consider the calendar. I do not, however, propose myself to ask the Statistical Society to take any part in an agitation for the reform of the calendar, but only to ask them to make up their minds as to the proper ordering of statistics, so that any League or committee that arranges a calendar may be fully aware of the requirements of statistical science. It would be something of a catastrophe for the League of Nations in its cosmopolitan wisdom to arrange a reform of the calendar and to learn afterwards that the requirements of statistical science pointed to something quite different; and such a catastrophe is really not unlikely, and for a curious reason, and that is the incompatibility or irreconcilability of the month and the week. I call the reason curious because, I suppose, no one can doubt that the seven-day week is intended to represent, as nearly as days can, one-quarter of the 29½-day lunar month. I understand that the Romans, with the nones of their calendar, intended to work upon the principle of religious observances at eight-day intervals, that is to say of an octave or eight-day week. They might in consequence see nothing incongruous in a 31-day month, but clearly a week of seven days is just a

little bit nearer to the quarter of 29½ days, which is 7·375 days, than a week of eight days. Both, however, are so far out of the true reckoning that a week is no longer reconcilable with the true lunar month. Four weeks of seven days are 1½ days short of a true lunar month and four weeks of eight days are 2½ days over the true month.

The whole subject is full of incongruities. The day can only be reconciled with the year by the device of leap year, which makes the number of days in the year generally 365 but sometimes 366. In like manner the week cannot be reconciled with the year unless we are willing to count one week of eight days in ordinary years and two weeks of eight days in leap years; or, perhaps to keep the data for the additional one day or two days separate from the 52 groups of seven days.

We are thus led to understand that all statistical presentations of observed facts which are concerned with a succession of periods of time must embody at least two principles, a principle of measurement and a principle of adjustment for the purpose of reconciliation; the statistical problem that I wish to suggest is to get the best principle in either case.

It is no exaggeration to say that the statistical method is in its essence a method of comparison of data at different times for different places, or for different classes of facts; consequently it is of the highest importance that statisticians should agree not only upon the principle of measurement but also upon the principle of adjustment. There is, so far as I know, no difference of opinion as to regarding the day as a primary unit in the principle of measurement, and there is complete accord in regarding the hour, the minute and the second as accepted sub-divisions of the primary unit. I refer to the unanimity with some sadness, because for modern methods of computation they are really barbarous divisions of the day.

Next to the day, the year is the most generally ac-

cepted unit, but the unanimity is to some extent affected by divergence of opinion as to the principle of adjustment. Generally speaking, we are agreed that a year consists of 365 days with an adjustment for leap year, but for some statistics the principle of adjustment makes the year generally 364 days (52 weeks) with an occasional year of 371 days (53 weeks). (*Cf. Nature,* vol. 15, p. 686, May 9, 1925.)

The week and the month are, as I have said, fundamentally irreconcilable, but they take on a specious appearance of reconciliation in the quarters which may be 13 weeks, including 91 days, or 3 months of 90, 91 or 92 days.

The main problem of the calendar which engaged the attention of astronomers and ecclesiastics long before the proper organization of statistics became a vital question, is the reconciliation of the lunar month, which has an average duration of 29:530588715 days with the solar year or cycle of the seasons which is 365:2422166 days. I do not propose to go into the history of the various efforts. They resulted in the compromise of our present calendar year of 365 or 366 days and our calendar months of 28,30 or 31 days. I only remark, that in so far as the desire was to keep in touch with successive new moons, our conventional months are an egregious failure. It is rather remarkable that it should ever have been accepted, and we may wonder what degree of compulsion was exercised in order to enforce the acceptance of the beginning of the calendar month as a substitute for the visible sign of the new moon for the payment of periodic instalments of rent or interest. All that really remains of advantage now is a duodecimal division of the year, though it is a division into twelve unequal parts. The principle of reconciliation of the month with the year as expounded by our calendar is frankly no reconciliation at all. And yet it is the basis of innumerable bodies of statistics. It involves a further attempt at reconciling the month with groups of days for shorter periods than

a calendar month, by dividing the month into three equal or unequal parts of 10 days, 11 days, 9 days or 8 days respectively.

Other and bolder statisticians have from time to time set up a principle of division of the year into periods of 5 days, of which 73 groups make up an ordinary year and only require adjustment in leap years.

My first endeavour will be, therefore, to set before you a summary, however imperfect it may be, of the principles of division for the purpose of measurement, and the principles of adjustment for the purpose of reconciliation of which examples are to be found in the presentation of actual statistics.

I shall first enumerate categorically the various principles of division and the accompanying principles of adjustment.

TABLE I—PRINCIPLES OF STATISTICAL PRACTICE

Category	Principle of division	Principle of adjustment
A	5-day periods	One 6-day period in leap year.
B	7-day periods (weeks)	One 8-day week in an ordinary year; two 8-day weeks in leap year.
C	7-day periods (weeks)	52-week year with occasional 53-week year.
D	10-day periods (decades)	11 days or 8 days in final period of the month, 9 days in final period in leap year.
E	28-31-day months	29-day month in leap year.
F	Quarters of 13 weeks each	52 or 53-week year, as C.
G	Quarters of the civil year of 3 months each.	As in E.
H	Quarters of the farmer's year (3 months beginning with September).	As in E.
I	Quarters of the "May year," centred at equinox and solstice.	As in B.
Z	Whole period year of 365 days	366 days in leap year.

NOTE.—Lustra of 5 years and decades of 10 years are sometimes used for periods greater than a year.

The Categories of Published Statistics

I next set out an enumeration of some of the bodies of statistics which are published, with the category to which they belong in respect of division and adjustment. In doing so I use the following abbreviations for the various classes of statistics:—

A = Agricultural.
F = Financial.
M = Meteorological.
R = Railway.
S = Social: Poor Law, etc.
T = Trades and shipping.
V = Vital statistics.

Table II.—The Categories Selected For Various Classes of Statistics in Different Countries

Country.	Class of statistics.	Category.	Country.	Class of statistics.	Category.
Algeria	M	E	Great Britain	A	C, Z
Argentine	M	E	„	F	Z (Mar. 31)
Australia	F	Z (June 30)	„	M	A, C (Sat.), E, F, Z
„	M	E	„	R	E, G, Z
„	T	Z (June 30)	England and Wales	S	E, G, Z
„	V	Z	„	T	E, Z
Austria	M	A, E	„	V	C (Sat.), F, G, Z
Belgium	M	E	Scotland	V	C (Sat.), E, G, Z
Bolivia	M	E	„	A	C
Brazil	M	E	N. Ireland	V	C (Sat.), F, G, Z
„	V	E	S. Ireland	V	C (Sat.), F, G, Z
Bulgaria	M	D, E	Greece	M	A, D, E
„	V	E	Holland	M	D, E
Canada	F	Z (Mar. 31)	Hungary	M	A, E
„	M	E	„	V	E
„	T	Z (Mar. 31)	Iceland	M	E
„	V	Z	India	M	E
Ceylon	M	—	Italy	M	D, E
Chile	M	E	„	V	E
China	M	E	Jamaica	M	E
Cuba	M	E	Japan	M	E
„	V	E	Mauritius	M	E
Czecho-Slovakia	—	—			
Denmark	M	E			
„	V	C (Sat.)			
Dutch East Indies	M	E			

TABLE II—THE CATEGORIES SELECTED FOR VARIOUS CLASSES OF STATISTICS IN DIFFERENT COUNTRIES

Country.	Class of statistics.	Category.	Country.	Class of statistics.	Category.
Egypt	M	Σ	Mexico	M	E
„	V	C (Wed.)	New Zealand	F	Z (Mar. 31)
Finland	M	E	„ „	M	E
France—			„ „	T	E, Z
Paris	M	E	„ „	V	Z
Strasbourg	M	A, E	Norway	M	E
„	T	E, Z	Philippine Is.	M	E
Germany	M	A, D, E	Poland	M	E
	T	E, Z			
	V	C (Sat.)			
Portugal	M	D, E	Switzerland	V	C (Sat.)
Açores	M	D, E	United States	A	C (Tues., Fri., Sat.), E
Lourenço Marques	M	D, E			
Russia	M	E	„ „	F	Z (June 30)
Spain	M	E	„ „	M	C (from Jan. 1), E
„	V	C (Wed.)			
Sweden	M	E, H	„ „	T	E, Z
Switzerland	M	E	„ „	V	C (Sat.), Z

NOTE.—The day in brackets following the letter C denotes the day on which the week ends; the date following the letter Z denotes the date on which the year ends.

"Trade returns are for calendar months in all cases."

Authorities—

Meteorological and agricultural publications in M.O. Library.

MS.—R.S.S. staff.

H.M.S.O.—Monthly list of recent publications of interest to the statistician.

Guide to current official statistics.

In cases where E (monthly category) is entered against M (Meteorological class of statistics) an annual summary is always given, and the category Z might therefore always be included. Z has, however, only been entered in the table in addition to E when there was some special note about annual values in the reference.

M for U.S.A. includes solar radiation at five stations.

With regard to meteorological statistics, the publication for international purposes is mainly regulated by

the decisions of the International Congresses of Vienna in 1873 and Rome in 1879, in which the calendar month and year were adopted as the normal unit with collateral approval of five-day means (pentads), with which in practice have been associated also ten-day means (dekades). The regulation, as given in the *Codex of Resolutions adopted at International Meteorological Meetings* is as follows:—

> As units of time should be chosen—
> 1. The mean solar day, reckoned from midnight to midnight, of the place of observation.
> 2. The civil year.
> 3. The months.
> 4. Dove's five-day periods (73 per annum).
> The calculation and publication of five-day means of temperature is recommended for a considerable number of stations in each net-work, the choice of which is left to the Central Institute of the country.
> It was decided to abide by the civil month everywhere, and to calculate the monthly means as pure arithmetical means. Moreover, the mean of the 12 monthly means is to count as the mean of the year.

The deviations from this practice are for the most part to be regarded as additions to the international data adopted for the more local applications of meteorology to agriculture and hygiene.

The statistical embarrassment of months of unequal length is such a common experience that I have made no special search for examples. I remember noticing, probably during last December, that one newspaper demurred to another's adverse comments on the trade returns for November as being tacitly based on a comparison of a 30-day month with a preceding one of 31 days.

The convenience of taking the months as one finds them justified their selection fifty years ago for meteorology when no other basis common to all countries was possible. But now that the experience of fifty years has shown the value of international cooperation, and has provided material for the conclusions that can be drawn *prima facie* from the compilation of meteorologi-

cal statistics, we are in a position to attempt a higher degree of accuracy. The desirability and even the necessity of such an advance are emphasized when we consider that statistical methods of computation have been very much developed during the past fifty years, and that we have now to deal with the inter-correlation of subjects as well as of countries and of seasons.

It is evident from Table II that the common meteorological practice agrees with that of trade, but is not altogether in accord with that adopted for the other classes of statistics, particularly of vital statistics.

It is also noted that at the inauguration of an international system the main purpose was to coordinate the existing practice rather than to devise the most effective engine for investigations by statistical methods.

In view of the divergences of practice, the time has arrived when those who are interested in the formation of effective tables of statistics should formulate some opinions upon the questions at issue.

I submit the following suggestions:—

1. That the reconciliation between the sub-period and the year should be accomplished within each year in turn, and not delayed for completion for a four- or five-year period.
2. That no reconciliation between the week and the month is possible.
3. That the consensus of opinion respecting "climate and crops," as well as vital statistics, is that a shorter period than a calendar month is necessary.
4. That, in view of the fact that the adjustment of months to the year fails to keep the months in touch with the actual phases of the moon, and is at best imperfect, the division of the year into twelve more or less equal parts cannot be regarded as a fundamental principle of statistical science.

On the other hand, when the week has been chosen for statistical purposes it has always been the week ending with Saturday, or with some other day, the same in successive years.

The only reason that occurs to me for rigorous adherence to the same day of the week for beginning and ending weekly periods, which seems to be of no importance in the case of months or years, is the habit in respect of weekly as compared with monthly or quarterly periodicals.

The second suggestion is sufficiently evident with very few words of explanation. If a body of statistics is made up in weekly periods they cannot be arranged in months without dissection into days, and *vice versa*. One cannot use an ordinary monthly form for weekly summaries; weekly and monthly summaries must be regarded as separate and independent enterprises.

For the third suggestion we may note that when in 1878 the Meteorological Council, a very powerful scientific delegacy of the Royal Society, set out to design a weather report for the purposes of agriculture and hygiene, they chose the week as the time-unit, not the month, and the decision is confirmed by the weekly *Weather and Crop Bulletin* of the United States Department of Agriculture; *Crops and Markets* are also the subject of a weekly periodical. It is quite possible that the original decision of the Meteorological Council was guided by the practice of the Registrars-General in respect of returns of births, deaths and marriages. In any case, it is matter of common experience that irreparable damage to crops can be caused by weather within periods much less than months. Indeed, for the study of weather in relation to crops or to public health, the daily values and the daily charts cannot always be dispensed with, and summaries for shorter periods than months are never indispensable.

DEVICES FOR MAKING STATEMENTS AND STATISTICS TRULY COMPARATIVE[5]

Five different methods are being used by concerns to overcome the defects which have been indicated. Each one of these methods will be discussed showing the advantages and disadvantages.

1. Use of Daily Averages: Some concerns use the daily average of the monthly data. This method is used more by statisticians in making accurate comparisons and calculations. The monthly variations can be entirely eliminated by this method. It has the disadvantage of an extra calculation and the result, as for instance the daily average sales, does not mean so much to the executive who is used to getting his report in the form of monthly sales. This is a good method to use in plotting monthly sales.

2. Use of Weekly Reports: Some concerns use weekly reports entirely for operating statements and have practically discontinued the monthly reports on account of the variations in the month. The following is quoted from a letter from the president of the White Sewing Machine Company:

> In the operation of our retail business all of our business is measured in multiples of weeks and we frequently more or less ignore the month to the extent that a week might overlap inasmuch as we would compare five weeks with five weeks, etc.

Concerns are making more and more use of the weekly report instead of monthly because it not only overcomes the variations in the month, but also gives a closer control over the business. For many reports this plan is advantageous. This plan would not be feasible, however, for the higher executives who would not care to keep in touch with all the operations of the business on

[5] From Folsom, M. B. Devices for Making Statements and Statistics Truly Comparative. p. 5-8. *American Management Association.* New York. 1927.

a weekly basis. Neither is it feasible for reports requiring a closing of the books.

3. Calendar of Four-Week and Five-Week Months: While both of the above schemes have advantages and can be used for certain purposes, it will still be necessary for most concerns to have a period corresponding to the month. A large number of companies are now using a calendar composed of four-week and five-week months for their accounting and statistical records. As an illustration, the General Electric Company adopts a fiscal calendar for use in their works. Each quarter consists of three periods, with thirteen weeks in the quarter. The 1927 calendar is as follows:

	Weeks	
January	4	Jan. 2—29
February	4	Jan. 30—Feb. 26
March	5	Feb. 27—Apr. 2
April	4	Apr. 3—30
May	4	May 1—28
June	5	May 29—July 2
July	4	July 3—30
August	4	July 31—Aug. 27
September	5	Aug. 28—Oct. 1
October	4	Oct. 2—29
November	4	Oct. 30—Nov. 26
December	5	Nov 27—Dec. 31

The make-up of the calendar is similar for each year, i.e., January always has four weeks, February four weeks, and March five weeks, although the first day and the last day of each month vary accordingly to the year. The corresponding months of consecutive years can therefore be compared with no adjustments. Other advantages of this type of calendar are that the month always consists of an exact number of weeks with no days beyond the weeks, and the quarters have the same number of days.

The chief disadvantage of this type of calendar is that the months do not all have the same number of weeks so that one month cannot be compared with another month of the same year without making adjustments for the varying number of weeks. The adjustments can be made, however, with less trouble than with the ordinary calendar, because the month-ends coincide with the week-ends. It is only necessary to divide one month by four and another month by five to put them on a comparable basis.

The following is quoted from a letter from the General Electric Company in regard to their calendar:

> A calendar of this description has been in use for about three years and while there are advantages and disadvantages, depending upon whether the works or the general office is involved, it has been found sufficiently valuable to continue its use, especially in the production and works accounting departments.
>
> Our works accounts are closed on the basis of fiscal month of four or five week period, in order that payrolls and statistical data may be compiled upon a weekly basis. If we close according to the calendar month, many of the closings would come in the middle of the week, which would mean accruing wages and would result in statistics regarding production, etc., for parts of weeks.
>
> On the other hand, our general office closings are made upon the basis of calendar months. The principal reasons for this procedure are that customers' statements must be rendered for complete months, and our balance sheets, in order to be clearly understood, must be for calendar months.
>
> Our fiscal calendar has its disadvantages when making up monthly comparisons, i.e., the difficulty of arriving at accurate comparisons month by month when you have a condition of both four week months and five week months. It is obviously incorrect to compare, for example, the production of a five week month as against a four week month.

The Famous Players-Lasky Corporation uses a calendar for their accounts similar in principle to that used by the General Electric Company, but somewhat different in detail. Their calendar does not correspond as closely with the regular calendar as the General Electric Company's due to the fact that February is given five weeks instead of four weeks.

This type of calendar is used by a large number of meat-packing companies. Armour and Company, for instance, use it, the year being divided into twelve periods, four five-week and eight four-week periods, the month ending on the Saturday nearest the end of the calendar month.

4. Four Weeks to the Month With the End of the Fourth Period Coinciding With the End of the Month: One large concern uses this method in compiling sales reports, both weekly and monthly. The first three periods correspond with the first three calendar weeks, and the fourth period includes the remainder of the month. These reports are issued currently and cumulative for each week, so that the cumulative report for the fourth period would always be the monthly report.

This scheme has the advantage of keeping the weekly reports within the calendar month. Comparisons bebetween the four periods of the month, however, are upset and adjustments are necessary if current weekly comparisons are made. This same concern uses charts upon daily averages, the charts being brought up each week. The curves show the daily average sales for the preceding four periods.

5. Thirteen-Period Year: A number of concerns are now using a calendar consisting of thirteen periods of four weeks each. The number of these concerns is steadily increasing.

THREE PLANS[6]

The most desirable change which can be made with the least dislocation of our present calendar, and which is incorporated in most of the proposed methods of reform, would be to have the same day of the year always fall on the same day of the week. As there are 52

[6] From article Reform of the Calendar, by Carl Reinhardt, Cobalt, Ontario, Canada. *Royal Astronomical Society of Canada. Journal.* 16:105-11. March, 1922.

weeks plus one day in a year of 365 days, and plus two days in a leap year, by adding this extra day or days, and not considering or designating them a day of the week or month, every day of the year will always fall on the same day of the week.

New Year's day, which is observed as a commercial holiday in nearly every part of the civilized world, seems to be by general consent the one best adapted to be made the non-week day in every year. There is not the same agreement in the proposals, however, as to the position in the calendar which Leap Year day, the extra non-week-day in leap year, is to occupy. It seems extremely desirable that it should be the *last* day of the year. Only in this way can the proposed "fixed calendar" deserve the name. To place it following New Year's day, or between the end of June and the first of July, as has been frequently suggested, would alter the position in the calendar of every day following it in that year, and one of the greatest advantages of a fixed calendar in astronomical and nautical calculations, banking and other reckonings, would be lost.

To have a second extra day during the holiday season at New Year's should be acceptable to all nationalities, while a holiday of no religious or commemorative significance in the middle of the year, would be both inconvenient in the commercial world, and interrupt a busy season in the industrial world. Placed in the holiday season as the last of the year, and therefore next to the other non-week-day, New Year's day, it will also make each half of a leap year the same length, 183 days. "Leap Year day" should undoubtedly be the last day of the year, no matter what other reform is adopted.

Having disposed in the above way of the extra day or days in the year over the even 52 weeks, the same day of the year will in future always fall on the same day of the week, and it only remains to consider how best to subdivide these 364 days into months. Of the methods

which have been proposed, three only are likely to receive consideration.

The first which we will consider, because it necessitates but little change from our present calendar is that proposed by Prof. L. A. Grosclaude, of Geneva, Switzerland.

The year would have twelve months as at present, each quarter of 91 days divided into three months of 30, 30, and 31 days.

This calendar has received very general approval throughout Europe, particularly by Chambers of Commerce, since it achieves its main object, a perpetual calendar, with the least possible change from our present one, no date in the latter having its position from the beginning of the year altered by more than two days in the proposed one. Each month has 26 working days, and each quarter is the same length, making it possible to compare production costs of one period with another in any industry. Each quarter begins on a Monday and ends on a Sunday, a convenience in closing accounts. Its disadvantage lies in the fact that the months do not begin on the same day of the week throughout the year, and it would therefore still be necessary for all except those with a good memory to consult a calendar to learn the day of the week of any day of the month.

The second method of reform to be considered here was discussed in the British Parliament in the year 1911, when Sir Henry Dalziel presented his "Fixed Calendar Bill."

In this also our present subdivision of the year into twelve months is retained, but it has the very desirable feature added of having the same day of every month as well as of the year always the same day of the week. This is accomplished by making all the months begin on Sunday and end on Saturday, and since it is impossible

in a year of twelve months to avoid a difference in length of the months, it is as well to increase this difference to a full week.

Each quarter of the year is the same length, 91 days or 13 weeks, and is subdivided into two short months of 28 days or 4 weeks, and one long one, the third, having 35 days or 5 weeks. January, February, April, May, July, August, October and November, would thus have 28 days, and March, June, September and December, each 35 days.

All the desirable features of this calendar are attained with no serious alteration from our present style, and also with but little change in the date of any occurrance or anniversary from that which it at present occupies. The average change for the year is only two days, and the greatest change which any date would undergo only amounts to four days.

It has the advantage to industries of making a comparison in production costs possible for each quarter year, simplifies a comparison of monthly costs over our present calendar, and greatly enhances the value of the week as a measure of time.

The advantage in computing bank interest, rents, etc., where the quarters are of the same length is obvious, and this advantage would be still further increased if the legal difficulties could be arranged so as to make the two non-week-days also non-interest or rent bearing days, so that 364 days could be known as a "Bankers' Year," when the quarter and the week would both be exact subdivisions of the year.

The third and last "Reformed Calendar" to be here considered is the "Thirteen Months Calendar" proposed by the French philosopher Auguste Comte nearly a century ago, and frequently discussed since by scientific societies and commercial bodies in various modified forms, but essentially the same in its main features. It has

also been several times presented in the form of bills to the British and other legislative assemblies of both Europe and America.

It has always been difficult to secure legislation for reforms of this character. Take for example the long fight which has been unsuccessfully waged to secure the adoption of the metric system in North America and Great Britain, or a decimal currency in the latter country. It is going to be doubly so to secure the simultaneous and identical legislation necessary in the present case.

In the final analysis it is the individual national parliaments, dominated largely by commercial interests, which will accept or reject whatever plan the coming conference in Rome adopts or recommends, and until public opinion has been educated to the point where the demand is unmistakable and insistent, and some degree of unanimity reached regarding the specific reform wanted, it will be impossible to secure from the politician the passage of such a law.

The goal of the astronomer is to obtain a fixed international calendar. Any of the three plans outlined above secures him this, and though a particular one of these may appear the most desirable, in reality it is not of vital importance to him which is chosen.

Quite a few scientific societies, as well as commercial and other bodies have unqualifiedly endorsed the 13 months calendar, often, it would appear, without a full knowledge of the other plans, and a bill is now before the House of Representatives of the United States in favour of it. On the other hand, European opinion appears to favour Grosclaude's proposal. Dalziel's method has many adherents in England, as securing the best features of the other two plans and offering an excellent compromise between the requirements of the banker and the manufacturer.

OTHER PROPOSALS FOR REFORM[7]

The international fixed calendar plan. Proposed by Moses B. Cotsworth, F. G. S., F. S. A., F. C. A., of Vancouver, British Columbia.

Liberty Calendar plan. This plan provides for the setting apart of New Year day in each year and making it an independent legal holiday, which is not included in any week or month. Also, the setting apart of the extra day in leap years as leap day and likewise making it an independent legal holiday. It further provides that each seventh day shall become leap year Sunday.

It further provides for the omission of such other leap year days as shall be necessary to harmonize the calendar year with the true solar year. It divides the remaining 364 days of each year into 13 months of four complete weeks of seven days each, beginning each week with Monday.

Swiss plan. This plan sets aside each New Year's day and each leap year day as independent legal holidays, and provides for the omission of leap year day in all centennial years the number of which is not a multiple of 400. This plan divides the remaining 364 days into four quarters of 91 days each, each quarter containing one month of 31 days and two months of 30 days.

This plan was proposed and advocated in the convention by Dr. A. F. Beal, of the Bureau of Standards, Washington, D.C.

John Robertson plan (first Scottish plan). This plan also sets aside New Year's day and leap year day as independent legal holidays. It then provides that the first two months of each quarter shall contain four weeks each, while the third month of each quarter shall

[7] From Eleven plans submitted to the first national convention in the United States to discuss the reform of the calendar, held at Washington, D. C., February 7 and 8, 1922. *United States. House. Committee on the Judiciary.* Modification of the calendar: hearing on H. R. 3178. p. 23-5. 67th Congress, 2d Session. February 9, 1922.

contain five weeks. Under this plan there will be eight months in the year of 28 days each and four months in the year of 35 days each, making with New Year's day a total of 365 days in the calendar year.

Alexander Philip plan (second Scottish plan). This plan proposes to make no break in the continuity of weeks; it would make no change in the present Gregorian calendar, except to take one day from August and add it to the month of February, simply undoing what was done in 28 B. C., when Augustus Cæsar took one day from February and added it to August, which was the month named after him.

Ghilain plan. This plan sets aside New Year's day and leap year day and divides the remaining 364 days into 10 months of 30 days each, and 2 months of 32 days each, thus retaining a 12-month year.

Metric calendar plan. This plan is of revolutionary character. It provides for 73 weeks of 5 days each, and for 10 months in the year—5 months of 36 days and 5 alternate months of 37 days each. This probably means the decimal plan, as there is no metric basis in it.

This plan would rename all the months of the year, and would also rename all the days of the week. It would go further and change the lengths and number of the hours in a day, and the number of minutes in an hour, with the idea of reducing all the shorter measurements of time to a decimal system.

The metric 5-day week fails to fit any one of its months.

Plan proposed by Dr. D. C. Savage of Nashville, Tenn. It is intricate. The author takes the position that the Julian calendar adopted by Julius Caesar in 46 B. C. should not have been superseded by the Gregorian calendar, and he advocates the restoration of the Julian plan with inclusion of certain features of the Jewish calendar.

INTERCALATED WEEK[8]

The present projected reform of the calendar is essentially different from the Gregorian one of 1582. Then there was question of cementing the calendar year closely to the solar year. For this purpose it was necessary merely to correct the Julian period of leap years. This was done in such a happy way that the error, which can never be avoided in any system, amounts to scarcely one whole day in three thousand years. The present desideratum is not a correction of this error, but a greater uniformity within the calendar year itself. The same days of the month are to fall on the same days of the week. As to whether this is an elegant or inelegant procedure, this is not the place to decide. There is question merely of testing the ways and means of effecting it.

In the library of the Vatican Observatory there is a special case devoted to the numberless schemes for the reform of the calendar, that have been sent to this supposed central station since the World War. These schemes are not less divergent than were the answers of four centuries ago of emperors, kings, dukes, learned men, academies and universities, that were sent to the Commission of the Gregorian Calendar.

With one exception to be detailed later, all the new calendars agree upon one point only, and that is upon the insertion of blind or blank or zero days, or days that are not to belong to any week. As the solar year is about one and a quarter days longer than a full number of weeks, the new calendar, if it is to be a year of weeks, will have each year one day over and in leap years two. What is to be done with these supernumerary days? The simplest remedy, one that by-the-way called for the least

[8] From article Reform of the Present Calendar, by William F. Rigge. Based on an article in the *Stimmen der Zeit*, vol. 106, nos. 3 and 4, 1923-24, by J. G. Hagen, of the Vatican Observatory. *Popular Astronomy*. 32:129-33. March, 1924.

reflection, was not to count these as week days at all. The simplicity of this solution appealed at once to all reformers, although they knew that the seven days of the week have followed each other in unbroken succession since the days of Adam, have been conscientiously preserved by patriarchs and prophets, and have been sanctified by the new-founded Christian Church in its Sunday observance. This time-honored and unbroken tradition would be shattered. Of course, the Christian Church is not bound by the law of Moses, it could make an exception to the religious observance of the seventh day, and at times permit the substitution of the eighth day, but it would be only fair to consult the wishes of the Jews on this point. And why should not historians also be asked whether they would relinquish a method of correcting a doubtful date by its day of the week?

These difficulties, however, seemed to make no impression upon the calendar reformers, and the scheme of the days of no week worked like a charm. But it also connoted a penury of ideas, because it never occurred to them that, besides days, other time intervals, such as months, could also be inserted in the civil year, as everybody that writes about the calendar ought to know from the methods employed by the ancients, especially the Jews and the Greeks. If months can be intercalated, why not weeks as well?

Now it has been shown more than twelve years ago, that the insertion of whole weeks would not interrupt the succession of the week days and would at the same time satisfy the pet idea of fixing the days of the year upon the same days of the week. But unfortunately, these reformers did not bother themselves about the literature of the subject.

In the *Publications of the Astronomical Society of the Pacific,* XXIV 161, (1912), there is an article by George M. Searle, in which the intercalation of weeks is explained in detail. Searle was for some years an

assistant of Gould at the Albany Observatory. After that he became a Catholic and joined the Congregation of Paulists. He was then intrusted with the small observatory of the Catholic University of America at Washington, and even proposed as director of the Vatican Observatory. His election, however, as Superior General of the Paulists brought his astronomical career to an end. It was exactly at this time that he wrote the article referred to, the general plan of which he had published many years before in the *Catholic World*.

Searle starts out correctly with the conviction that every rule for intercalation must be cyclic, as had indeed ever been the custom in all calendars. Who does not know of the Egyptian, Chaldean and Greek cycles, the predecessors of the Julian and the Gregorian? Leap years, or years in which an intercalation is to be made, must be known to the public without the necessity of a printed calendar.

Now Searle made the discovery that insertions of whole weeks could be elegantly fitted into the Gregorian cycle of 400 years. This cycle consists of an integral number of 20871 weeks. For, as each year at present has one day more than a full number of weeks, this would make, first, 400 days over. Then there are, secondly, 100—3=97 leap years during this period, giving so many days more. There are thus in all 497 days more than full weeks, and these 497 days may obviously be distributed in 71 full weeks. These 71 weeks Searle proposed to add singly to ordinary years which should each have 52 weeks exactly with no day over, that is to say, his ordinary year should have 52 weeks or 364 days and his leap year 53 weeks or 371 days.

As to the manner of distributing these 71 leap years in the cycle of four centuries, Searle proposed this very simple way. First, every fifth year is to be a leap year. But as this would give 80, 9 more than the 71 needed, he said: Secondly, the years whose number is divisible by

50, however, are to be common years. This would make 8. The ninth exception must then be placed somewhere else in the cycle, either in the beginning, the middle or the end. Again, therefore, and more briefly, *Every year whose number ends in a* 5 *or a* 0 *is a leap year, except when it ends in a* 50 *or a* 00, *and when it begins a new cycle*. This rule is simpler even than the Julian and the Gregorian with their division by 4.

It is to be especially emphasized that when Searle proposed his scheme, he had no idea of changing the months, except in so far that one of them was to lose a day, and in leap years one was to be a week longer than usual. But his method had the express purpose of making every day of the year fall on its same day of the week, without interrupting the regular sequence of weeks. Whatever shortcoming an intercalary week may have in respect to an intercalary day, is fully balanced by the retention of unbroken weeks. It has, however, the decided advantage, that the error of the Gregorian reckoning here loses its entire significance. For if this amounts to less than a day in three thousand years, it will not grow to a full week in twenty thousand years.

This is certain, therefore, that the permanency of the days of the year in respect to the days of the week does not depend upon the months. Of course, matters may not rest here, and an attempt will be made to unify the months. The two questions should, however, be kept apart.

It is not the purpose of this article to enter upon the many methods that have been proposed in the rearrangement of the months. It was merely to direct attention to this one point that the pet idea of uniformity may be realized without disturbing the time-honored sequence of the seven days of the week. That all the reformers of the calendar with one exception have proposed the

scheme of blank days, or days of no week, appears to be due to the fact that they know of no other way. Now that this way has been found, these blank days, it is to be hoped, will be buried forever.

OBJECTIONS TO INTERCALATED WEEK[9]

In the collection and discussion of meteorological and many other statistics, "monthly means" play an important part. Although the irregular calendar month is not, for scientific purposes, an ideal subdivision of the year, its faults are not sufficient to outweigh the advantages of a unit so familiar to the general public. These monthly means, would, however, lose all their significance, if the calendar month did not, year after year, remain in nearly the same position relative to the tropical year. With the present calendar the range of this position for any one month is a day only, over a short period of years, except at the end of a century, when it may be nearly two days, and even over a long period of years it is less than two days. A range of this size is unavoidable, and is not large enough to affect very materially the value of monthly statistics.

Under the scheme of intercalated weeks, however, the range over even a small number of years would be a week, while at the middle or end of a century it would be eleven days (or even seventeen, but as regards this point see below), and the range over a large number of years would be eleven days. There would, moreover, be an odd week of statistics every fifth year, which could not be as easily disposed of as is the odd day in leap year at present. The present convenient system of collecting and presenting data by calendar months would have to

[9] From article Reform of the Present Calendar, by H. Jameson, Colombo Observatory, Ceylon. *Popular Astronomy*. 32:416-17. August, 1924.

be given up, at any rate in the case of climatological and other scientific statistics, and suitable units chosen, with reference not to the calendar, but to the tropical year. This would not only entail much additional work in the preparation of these figures, but would greatly diminish their value to the general public.

Searle's scheme could not fail to cause much inconvenience, too, in ordinary business life. For example, is the same yearly rent to be paid for a house or for business premises, over a year of 53 weeks as over one of 52? Will a man on a yearly salary receive the same for 52 weeks as for 53? His expenses will be appreciably higher in leap year. I can foresee difficulties, too, with the income-tax collector, regarding the assessment of the yearly profits of a business. An extra day in leap year might be passed over without adjustment, but hardly an extra week.

Where accounts are kept, and salaries paid, monthly, the extra week would also tend to complicate matters, and to create confusion.

It might be objected, that the present calendar months vary in length among themselves, and that, nevertheless, no difficulty is experienced in keeping monthly accounts, or in paying monthly salaries. Why then should there be any difficulty in variable years? But over a very few months, the variation in the length of a month practically averages out, while it would take five years to average out the variation in the year.

I cannot see that these objections to an intercalated week are in any way balanced by the merely sentimental advantage of unbroken weeks, plus perhaps a slight advantage to historians of the future in checking their dates. No reform of the calendar can be considered satisfactory, which varies the length of the calendar year, or its position relative to the tropical year, more than the minimum absolutely necessary.

IMPORTANCE OF UNIVERSAL APPEAL[10]

The importance of a uniform and simple calendar is not a question which affords any ground for dispute. Whether regarded from the point of view of the chronologist, striving to evolve order out of regnal years and intercalary months, or from that of a business man in Cairo, transacting affairs with clients who adhere severally to the Moslem, the Coptic, the Hebrew, the Julian, and the Gregorian calendars, the diversity of system from time to time, from place to place, and between creed and creed, is an exasperating and unmixed misfortune. The New Year festival is celebrated by the motley races which go to make up the population of Singapore on dates which extend over several months. In Constantinople, until quite recently, even the division of the day was a source of grave inconvenience, since the day ended at local sunset. The persistence of such anomalies shows how hard is the way of the reformer. Tradition and religious scruple, and even the mere inertia of custom, are leagued against him. From the point of view of the whole world, a far greater advance would be made by any large step towards the adoption of one universal calendar than by making small theoretical improvements in a particular system, however important that system may be. Whatever happens, it is certain that the Gregorian calendar in its main features will survive. For this reason alone its reform is not to be lightly undertaken. A universal appeal can only be based on fixity of tenure as a necessary condition. The French Republican calendar should at least be useful as an awful example. Changes in our calendar can only be admitted after their necessity has been absolutely proved, and then only with the utmost deliberation. It is not a matter in which a false step can be easily retraced.

[10] From article Reform of the Calendar, by H. C. P. *Nature.* 86:281-2. April 27, 1911.

AFFIRMATIVE DISCUSSION

CALENDAR REFORM[1]

The purpose of a calendar is to measure and register the passage of days throughout each year; and to arrange in advance what dates shall be Sundays, workdays, holidays, etc., for general convenience.

Neither the length of the year, nor that of the day of twenty-four hours can be altered.

Both months and weeks are arbitrarily fixed units used for measuring intermediate periods beyond the day. They are not divisions of time indicated by either the sun, moon or stars. Their usefulness and convenience are increased when the month is an exact multiple of the week, and when the year is as exact a multiple of both the week and month as nature permits.

For more than half a century several bold minds in different nations have recognized the disadvantages of a multiplicity of calendars and the serious imperfections of all, including also the inconvenience of the ever-changing dates for the great religious festivals of Easter, the Passover, etc.

Many suggestions have been made to remedy some or all of such faults.

The answers to the enquiries of the [League] Committee clearly indicated that the simplification of the calendar is almost wholly a question of business, industrial, social and home benefits to be thereby conferred on humanity. Astronomers are interested only like other citizens. The religious organizations are chiefly concerned

[1] From pamphlet "B" by M. B. Cotsworth, Director, International Fixed Calendar League. p. 1-15. Washington, D.C.

about Easter and the orderly succession of Sundays or Sabbaths.

The simple remedy for the confusing defect caused by the practice we needlessly follow every year, of invariably giving a week day name to each year's last day, and likewise each leap year giving an unnecessary week day name to "leap day" is, to stop the practice of giving week-day names to "year day" and "leap day," which could best be known only by those distinctive names. We propose that those days be established as extra international Sabbath days of rest and worship. Such a step, by its ultimate effects, would not only stabilize the calendar, but also help to extend the growing desire for peace and brotherhood among all nations.

Objection has been made to applying this year day and leap day remedy, because those inserted days would interrupt the rigorous succession of Sabbaths, and thus might be regarded by some extreme religionists as constituting a technical violation of the Bible's fourth commandment. However, it now seems proven by the very definite commands of Moses; (as explained in our Pamphlet "C") that the Israelites were, by like means to those we propose, commanded to observe once each year at the Feast of Pentecost, a double Sabbath of two days' duration. The calendar effect of thus using two Sabbaths together was, to cause all Sabbaths of every later year to fall upon exactly the same monthly dates year after year.

That being the evident fundamental provision of the Mosaic law as regards the Fourth Commandment to observe the Sabbath; it now seems plain that in the fourth century A. D., when our present Christian as well as the modern Jewish calendars were formulated in their Sunday and Sabbath arrangements, both Jews and Christians in their zeal to hold fast to their separate Sabbaths and Sundays, were either forgetful or ignorant of that basic Sabbath-fixing requirement in the old Mosaic law

when they altered their calendars, which in our opinion were then unintentionally, and now are, unscriptural in structure.

Therefore, the adoption of the "year day" and "leap day" feature of the thirteen-month calendar, is literally a return to the unaltered principle of the Mosaic law, which fixed all Sabbaths on yearly unchanging calendar dates. For this reason, we are hopeful that the religious authorities and adherents in the Jewish, Christian and Mohammedan religions, who now form the progressive half of humanity, and all of whom accept the truth that Moses was their religious Law-giver, will after reading our Pamphlet "C," realize that with great benefit to all religions, they can all loyally unite in the use of the proposed international Sabbath.

No reasonable excuse can now be successfully pleaded by either Jews, Christians or Mohammedans, against uniting in the mutual use of the international Sabbaths as Moses commanded. Such Sabbaths have brought very great physical and practical religious benefits to the three hundred and thirty millions of Hindoos, Mohammedans, Buddhists and other competitive religionists throughout India and South East Asia, who now unite in using Sunday as their inter-religious rest day, as the Israelites united with their camp followers in mutual rest on the same Sabbath days in every year.

Therefore, we very respectfully suggest that Jews, Christians and Mohammedans should follow the admirable example set by the people of India, who have given practical effect to that eminently desirable law which Moses proclaimed.

We know that the length of the day and the year are inexorably fixed by natural laws: and that humanity will neither tolerate any change in the length of the seven-day week; nor give up the use of some form of month, which should be standarized for universal convenience.

Therefore, simplifications of the calendar which must be beneficial to be acceptable are limited to redividing the 52 whole weeks which should be in every year, into more convenient groups of weeks in the months and quarters of the year.

The twelve-month proposals are nearly all designed to begin each year with New Year day as January "O" preceding January 1st. They all would divide the year into four quarters of three months each, containing 13 weeks. In common years one such quarter, and in leap years two quarters, would have months with 30, 31 and 31 days; the other three quarters would consist of 30, 30 and 31 day months in ordinary years.

To scientists as well as the general public, that part of the plan to call the first day of the year a zero day and number the succeeding days 1, 2, 3, etc. seems a very unscientific and undesirable proposal. It would be like calling the first and last inch on a yard-measure 0 and 35, instead of 1 and 36. In a similar way this proposal would justify calling the first and last months of a twelve month year 0 and 11. The symbol zero (0) in all scientific measurements stands for something smaller than anything we can measure. A whole day *cannot be designated as* (0).

The symbol (0) can apply only to the infinitesimal instant which marks simultaneously the end of one and the beginning of the next year, month, day, hour, minute and second.

It is difficult to understand how anyone can advocate this part of the proposal, which should be insistently opposed.

In all the present and proposed twelve-month calendars, either with or without the "year day" remedy, the week day names associated with dates in consecutive months, would change and differ from month to month very much as they do now.

Further, their months would be almost as unequal and uncomparative as now. The existing inconveniences

which would be thereby continued are easily indicated in part by the following of many facts we could cite:

1st. That the present difference between 30 and 31-day months has caused many business accounts in leading European countries, also nearly all trade accounts and business drafts throughout the United States and Canada, to be paid for on the 30-day basis instead of calendar months.

2nd. That for the same reason the United States Government pays its employees on the basis of 30-days per month, and has had to print numerous different sets of wages-table books to overcome such calendar-caused difficulties.

The proposed calendar would divide the year into thirteen equal months, each composed invariably of four full weeks, and therefore 28 days repeating each day name on the same twenty-eight dates in every month alike. The last 13 days of the present month of June, together with the first 15 days of July, would be combined to make up the new month required. It is proposed to name the new month "Sol" because the sun passes its summer solstice denoting the longest day on June 21st which would become the 4th of this proposed month.

The month of February, 1925, is the model for this month, which would always be repeated for dates and day names in the other months.

This plan utilizes the year day and leap day remedy as a very desirable feature, though that remedy can be dispensed with if necessary, but its absence would deprive humanity of about 30 per cent of the total value in benefits which complete reform would confer upon all civilized people.

Because any change from the old to an improved calendar would make some slight break and cause part discontinuity in dates and chronological records, and would in part disarrange some social and statistical affairs for a short time; the introduction of a new calendar must be

justified by reason of the definite benefits its use would confer.

Some advocates claim that 12 months form a better calendar than 13, because 12 is divisible by 2, 3, 4 and 6, while 13 is not. There does not appear to be any important agricultural, commercial, economic, social or scientific needs which require anyone to divide the year by 3 or 6.

On the other hand fourths and halves of the year are almost as well represented by 13 and 26 weeks respectively in the thirteen-month calendar, as by 3 months and 6 months in the 12-month calendar; because by the thirteen-month calendar, the work on monthly and quarterly statements only once come together, at the end of the year. Three of the quarterly statements would fall within their months, and thus distribute the quarterly from the monthly accounting and thereby lessen congestion at busy month-end times. However, this question of indivisibility *is inconsequential,* and nearly all its advantages are afforded by the twelve-month calendar we already have.

Our present calendar and all the proposed ones based on twelve-months are objectionable, because their number of days in the months can never be equal.

Now that, next to the day, the week has become the most used and valued unit of reckoning throughout every nation, the greatest defect of all twelve-month calendars is that their unequal months cannot contain exactly four weeks.

This is the far-reaching defect that causes:

1. Renewal and printing of millions of new calendars annually;
2. Complicates otherwise simple reckoning of days and dates and the passage of time generally;
3. Makes work days, rest days and week ends unequal in consecutive and different months;
4. Makes incomparable the business and industrial activities, including the economic and statistical

data used in agriculture and many scientific investigations;

5. Makes the period for earnings and expenditures of workers, employers and families unequal.

The elimination of this worst of all defects is the great objective of calendar reform.

It is to remedy this calendar defect which is much more serious than all other defects in the calendar combined, that the thirteen equal month plan has been devised. Its practical simplicity is shown, not only by the model month, but by more impressive comparisons.

Only habitual use of the defective old twelve-month calendar by those who are unconscious of, or indifferent to, the needless waste and inconveniences its use incessantly imposes upon humanity, can explain how any one can even temporarily advocate its perpetuation, or that of any other twelve-month calendar with like inherent defects.

On the other hand, only lack of intimate acquaintance with the useful simplicity and great practical benefits that will be conferred upon all civilized people, by the adoption of the much easier and more convenient thirteen-equal-month calendar, will cause any one to oppose its introduction.

The twelve-month calendar with equal quarters as a reform, was first proposed about forty years ago. Changing the various calendars used by humanity at that time was a vastly more difficult reform to make effective than it is to-day. Then the great masses of humanity knew very little of the merits of the practical affairs affected by calendar reform; were wrongly accustomed to think that the lengths of the months were fixed as, or by, the motions of the sun, moon or stars. General international cooperation on a world scale was almost unknown.

The plan then found some favor in the minds of several astronomers and a few frank thinkers, because its

proposed changes from the old twelve-month system were so slight and inconsequential that its introduction was expected to arouse little or no public antagonism. But they were inevitably disappointed when the great railway, commercial and scientific authorities, who had then welcomed the adoption of standard time, would not endorse the inadequate plan.

The situation is very different today. A large part of the public have become practically acquainted with the serious defects of the old calendar, and they appreciate the superior merits of the thirteen-month plan.

The League of Nations, international, commercial, labor, women's and other organizations now cooperating for establishing such mutual advantages are now cordially available.

The equal quarter plan has been a past transition-stage in the evolution of this calendar reform of the twentieth century. It has outlived its embryo purpose.

Its inconsequential changes formerly led some enthusiasts, without critical examination of its defects, to favor its acceptance. Now those inadequate changes are clearly seen by industrial, commercial, government and transportation authorities, to offer such unimportant benefits when compared with the far more useful thirteen month plan as to throw the preference of practical authorities almost unanimously in favor of thirteen months of four weeks each.

The impelling motive in calendar reform is now, and should always be, to secure the simplest and best form of calendar that will bring the greatest permanent benefits. Serious defects in any plan cannot be condoned because its methods may at first seem easier to introduce.

To the masses of humanity who cannot themselves appraise the merits of different plans, one kind of change is almost as easily made as another. About 300 millions of the least changeable races of Asia, Africa and Eastern Europe have very easily changed to the Gregorian calendar since the Great War.

The detailed and specific benefits which would be conferred by the thirteen-month calendar are so numerous and outstanding that it seems best to enumerate those most easily listed as follows:

Advantages of 28-day Months
(*Not attainable by 30, 30, 31-day months*)

1. All months would be equal; having exactly the same recurring 28 week-days, of equal monthly calendar value.
2. The day of the week would always indicate the monthly date, which conversely would indicate its week-day name. Both day and date would invariably be recorded on clocks and watches.
3. Would save time, and many wasted costs, prevent mistakes, and avoid date-confusing worries.
4. The complete four weeks would exactly quarter all months, harmonizing weekly wages, and expenses with monthly rents, accounts, etc.
5. Pay-days, markets, fairs, meetings, etc., would recur on the same monthly dates. That regularity would facilitate both business and home life.
6. Each week-day would recur on its four fixed monthly dates, thereby making more regular the weekly and monthly work, payments, production, etc.
7. Accounts, drafts, etc., would never come due on Sundays.
8. Permanent monthly dates for recurring public, home, business, school, law, holiday and sport affairs would be established.
9. All periods for earning and spending would be either equal, or exact multiples of each other.
10. Every month-end would coincide with the week-end; most convenient for business, rents and general affairs.
11. Monthly balances of income and expenditure would be easier for public, commercial, financial and

family life, as fractions of weeks at month-ends would cease.

12. Would release us from 5th weekly payments for rents, wages, etc., in unequal months; adjustment of overhead charges, statistics, etc., while saving some expenses and helping progress.

13. Would enable us to instantly know the number of days between any two dates for salaries, interest and other computations; e.g., 1st month, 10th to 6th month, 20th; as 28x5=140, plus 10, would be 150 days.

14. These months of equal length and same total week-day values, would give great statistical advantages by truly measuring current fluctuations in government, export, import, business, scientific, health, city and home affairs, at the end of every month, without either adjustments or explanations being required from officials whose time is valuable; and without wasting the more valued time of directors anxious to promptly discern at the end of each month the true trend of business, to guide their decisions.

Statistics have become the guide reins in all such concerns, whose leaders depend upon statistical records to ascertain the facts, upon which they decide what future action should be taken.

15. Half of humanity is composed of women, everyone of whom will be greatly benefitted by the 28 days per month calendar in their personal reckonings of exactly one month and 10 months. Every day they will benefit in directing their household affairs and accounts in weekly and monthly terms; also in arranging their public, private and home engagements.

16. Would collectively save great national, business and individual values of time and money wasted in searching for, and referring to calendars, from which suitable days and dates have to be found for work, pay, correspondence, proposed meetings, etc., also in drafting, advertising, printing and law costs of such phrases as

"Tuesday after the 1st Monday," the "2nd and 4th Fridays," etc., in laws, rules, regulations, etc.

An estimate made of such economies in the United States at clerk rates, indicates a yearly saving of about $30,000,000 in that country alone.

17. By using thirteen months of 28 days, all monthly money values now circulating twelve times per year for labor, salaries, rents, pensions, etc., also for manufacturing, wholesale, retail, railway, shipping, etc., accounts would circulate thirteen times per year. Therefore for each $30 and $31 of liquid capital now circulating in that monthly service, only $28 would be required, as by circulating thirteen times, this sum would do the service for which $30 and $31 are now (and would by 30, 30, 31-day months be) required.

The estimates thus far made of the total money values which would be thereby released during the first three months in which 28-day months are used, indicate that about $2,000,000,000 would be released in Europe for business expansion and improvements and for all nations combined, about $5,000,000,000.

More extensive investigations are now being made in leading nations to test those estimates.

The resulting benefits to workers in lowering the cost of living, rents, interest on mortgages, city and other taxation, together with the increase in employment that would result, are indicated in my report to the Director of the International Labor Office of the League of Nations at Geneva.

They, with the above recorded benefits of four-week months, would bring the estimated 70 per cent of total value required to achieve the full 100 per cent obtainable by complete reform. Most of the other 30 per cent would be derived by the insertion of year day and leap day.

That would be about twenty times more valuable than the aggregate of benefits 30, 30, 31-day months can bring.

Calendar-Caused Deflections in Statistics

The monthly *Index of Manufacturing Production* issued by the United States government, is the most elaborately prepared and widest used record of monthly statistical information.

Yet, because American producers usually work eight hours per day from Monday to Friday and only four hours on Saturday, the calendar on that basis of forty-four hours per week, brought 192 hours for production in November, 1923, as against 180 hours in November, 1924.

The above United States index number was published as 113 per cent for November, 1923, and only 110 per cent for November, 1923; the latter showing an apparent reduction of three points, when compared on the basis of the year 1919 monthly average as 100 per cent.

In reality there was an increase of four points, as the following arithmetical adjustment proves, because November, 1923, having 5th Thursdays and Fridays yielded 16 hours for work, against November, 1924, having only 5 Saturdays and Sundays, allowing but four working hours beyond the 4 full weeks of 44 hours each, which regularly total 176 hours as the basis for testing true comparisons of production.

As 180 hours in 1924, were to 192 hours in 1923, so should the 110 points indicated by the unadjusted tabulated totals for 1924 be to $(192 \times 110) \div 180$, yielding 117 points as the true comparative index, according to the working hours available in factories working regular weekly hours.

That is evident where regular units of production per hour were collectively maintained. But in those cases, as also for individual factories working over time, or short time, world-wide extra work at statistical adjustments is imposed by the present calendar upon those who strive to find the true monthly trend of business.

Such difficulties and extra work would be abolished by the regular use of four-week months.

To fairly test the comparative business effects of the present unequal calendar months against those of the proposed one for four-week months, we take the case of a factory regularly producing the same quantity of goods per working hour from August 1st to December 31st, 1924, to prove that its monthly comparative production would be August, 100; September, 102; October, 106; November, 96; and December, 106 per cent of August, thereby calendar-causing a misleading decrease of 10 per cent in November, and permeating business statistics with four different ratios of deflections, inherent in those monthly totals.

Further, please note that manufacturers who paid their weekly wages on Saturdays had to provide five weekly pays in each of the two least productive months of August, 100, and November, 96 per cent, while giving monthly credits for the goods they sold.

In other lines of business, such as railways and hotels, the different values of the respective week days show different monthly deflections caused by the calendar.

For example, Horwath & Horwath, the eminent accountants for very many American hotels, estimate that for room sales, Mondays average 17 per cent, Tuesdays 17 per cent, Wednesdays 18 per cent, Thursdays 18 per cent, Fridays 12 per cent, Saturdays 10 per cent, and Sundays 8 per cent.

On that basis a $10,000 per week hotel in 1925, April would average $1,453.33 per day; *whereas May with* 1 *day longer and* $10 *more per day received,* would only average $1,397.10 per day, because the 5th Wednesday and Thursday in April were worth $3,600, whereas the 5th Friday, Saturday and Sunday ending May were only worth $3,030.

The total room sales for May were $290 less, and the average daily sales were $56.23 less than in April.

All those differences were entirely caused by irregularities in the changing Gregorian calendar, which in the year 1924 indicated August as 100, September 101, October 104, November 97 and December 105 per cent of August, on the basis that weekly sales were exactly equal throughout those five months.

The proposed four-week months to begin the year 1928, would show the true 100 per cent production from August 1st to December 28th, and by that always equal multiple of four times the universal week, would always record the true ratios of actual increases and decreases in production, business affairs and home expenses.

Neither the inadequate 30, 30, 31-day months proposal, nor any twelve-month calendar can bring the numerous and valuable benefits recorded above. The fact is, that they can only be derived by establishing the use of the calendar of thirteen equal months.

Those benefits will only be experienced when the length of each month is internationally established as an exact multiple of the now universal week which is the calendar unit regulating work and rest.

Even if the twelve months were equalized as much as possible, workmen during the 31-day months would suffer a 2 per cent decrease in earnings, against 10 per cent increase in expenditures—totaling a disparity of 12 per cent.

That is because those months would include both a 5th Sunday, during which such workers would earn only on one-half of Saturday; but their expenditures on those two days generally average about twice the amount expended on any other two days of the week, through week-end costs of family requirements, recreation, trade-union, church, club, etc., contributions, and other weekly charges.

Those costs would, by the twelve-month plan, be made much harder for workers to bear, than under four-week months, especially when they accrue at the month-end,

when rents, insurance, hire and purchase of furniture, etc., with other monthly payments become due.

CALENDAR CHANGE[2]

A change in our present calendar is so inevitable and the opinion of the world is crystallizing so rapidly in favor of a simplified calendar, that I am glad to place before you a few facts which will prove that this great movement is economically sound and internationally practicable.

Before discussing the calendar, let me recall to your minds a similar movement which, as a world topic, developed international success forty years ago.

In 1879 Sir Sandford Fleming, builder of the Canadian Pacific Railway, experienced such difficulties with the different kinds of time then in use in the United States and Canada, that he conceived the idea of "standard time." In New York City there were six different clock times in use; Chicago had seven varieties—most other cities varied.

Despite the public confusion and business wastefulness which that condition imposed upon the nation, it was argued and widely believed that local noontimes could never be changed.

By 1884 the sentiment in favor of standard time was so universal that President Arthur called an international conference. Two years later standard time was adopted by all leading nations with but one exception. Today that international standard time system is used, and has developed great public convenience throughout the world. It is so universal, that most people have forgotten that any other time ever existed.

The present movement to change our calendar is as certain to succeed as was the acceptance of standard time.

[2] From Address by George Eastman, Eastman Kodak Company. Rochester, N.Y., before the United States Chamber of Commerce, October 18, 1927.

It was started by Mr. Moses B. Cotsworth, who is recognized throughout the world as an eminent statistician and practical scientist.

Our company's experience led me to investigate the plan which Mr. Cotsworth had originated. He had studied the practical aspects of this subject for more than thirty years, in as many different countries. He was associated with Sir Sandford Fleming in Canada, and is the recognized international authority on calendar simplification throughout the world.

That an agreement will be easily attained is evidenced by such facts as these:

During the last twelve months Mr. Cotsworth has personally consulted the government, commercial, labor, economic and other experts and organizations in the capital cities of more than twenty European nations, and found them favorable.

A few months ago I sent personal letters to more than one thousand representative men in this country, asking them to give me the benefit of their counsel. The response to this letter was so overwhelmingly favorable; the interest was so genuine and the businesses represented were so diversified that I am here today, not as an individual advocate but as a representative of the considered opinions of these business and professional leaders.

To enable you to realize the considered opinions of these leaders and their eminent standing, I submit typical excerpts from their replies.

Many concerns in this country and throughout the world are already using the thirteen 28-day periods in their own accounting systems. One of the largest distributing companies uses it in its fifteen thousand chain stores. A large motion picture producing corporation uses it in two hundred subsidiaries. All British railway companies unanimously adopted the Cotsworth Plan for cost purposes and indorsed the reform.

The Skoda Works in Prague, employing twenty-two thousand workers, and many German business concerns are now using 28-day periods. As it is in actual use today in trade, industry and transportation, the practicability of a simplified calendar is no longer a matter of doubt.

Because official representatives of the great Christian Churches have assured the League that they are in favor of a fixed Easter, there is reason to believe that the date of this church festival (which can only be set by the religious bodies themselves and not by government or business) will fall on April 15th in each year under the proposed calendar.

Some people say that the calendar cannot be changed. What kind of an argument is that? You business men know that the world moves inevitably towards the practical, and this change in the calendar is as practical as was standard time.

There exists today only one obstacle. That is inertia, and that, I am certain, can be overcome. This is an opportune moment for American business to assume the leadership.

RECOMMENDATIONS OF CHAMBER OF COMMERCE[3]

Your Committee believes that, if changes of the kind opposed by the Committee of Enquiry [of the League of Nations] are eliminated from discussion, attention can be concentrated upon the more fundamental questions. These are three in number, and are:

A. Should the divisions of the year in the present calendar be so changed that there will be greater uniformity in length and consequently better comparability?

[3] From Report of the Committee on Calendar Reform of the *Chamber of Commerce of the United States*. p. 7-15. Washington, D.C. April 30, 1929.

B. Should the weeks be fixed in their relation to the divisions of the year in which they occur?
C. How should the form for changes be determined?

A. *Revision is Needed*: *Your Committee recommends that the divisions of the year in the present calendar should be so changed that there will be greater uniformity in length.*

The Committee has reached this recommendation after considering the business difficulties which arise under the present divisions of the year. As has been pointed out in the portion of the report of the Committee of Enquiry the two half-years are not at present equal in length, there is a variation of 3 per cent in the length of quarters, and a variation of as much as 10 per cent in the length of months.

For these computations the total number of days in the months has been used. If Sundays are excluded, the first half of 1929 will contain 155 week-days and the second 158; the quarters of 1929 will contain respectively 77, 78, 79 and 79 week-days, and the number of week-days in the month will range from 24 in February to 27, with two months containing 25 week-days, four months 26 week-days, and five months 27 week-days.

The variations in working days are even more marked. Of course, holidays do not enter structurally into the calendar. In the United States any one of them could be abolished, or changed from one calendar date to another, in the same month or another month, by state legislation and without any alteration in the calendar. Questions about holidays are consequently not before this Committee, but for purposes of information we add something about the variation which now occurs in divisions of the year by reason of holidays.

In effect, holidays increase the variation which occurs by reason of the present divisions of the year. As

legal holidays are a matter of state law, the number of holidays differs in the various states. The holidays common to all of the states are:

New Year's Day	General Election Day
Washington's Birthday	Thanksgiving Day
Independence Day	Christmas Day

In addition, the following are holidays in so large a number of states as to have general importance:

Lincoln's Birthday	Labor Day
Good Friday	Columbus Day
Memorial Day	Armistice Day

Most states have one or more other holidays. If only the twelve named above are considered, however, it is found that they will cause among the months of 1929 a variation between 22 work-days in February and 27 in August. In other words, the number of work-days in February, 1929, will be 18 per cent less than the number in August. The number of work-days in the four quarters of 1929 will be, if these 12 holidays are considered, respectively 74, 76, 77 and 75.

Some emphasis has been laid upon the advantage to business men in having more equal divisions of the year for recording the results of business operations. There would be benefits, too, in collection and use of engineering and scientific data which have a reference to periods of time.

That the recommendation of the Committee is practicable from the business point of view seems to have been demonstrated by the number of American companies that for their own internal purposes are using calendars which give them more equal divisions of the year than the calendar in general use. There are instances in which American companies have used these special calendars over a period of many years.

It will be recognized, also, that there is nothing in astronomical facts to interfere with the Committee's recommendation. The year and the day are astronomically fixed, but months, quarters and half-years are not related to astronomical events.

The Committee's recommendation could be carried into effect, too, without disturbance of existing contracts. An obligation to pay money upon a future date, for example, would in no way be modified; for the corresponding day upon the new calendar would be the same date as the day specified according to the present calendar. Where statutes, national or state, prescribe that an act is to be performed on a date or before a date, a simple piece of amendatory legislation would substitute the corresponding dates of the new calendar. March 4 as the date for the beginning of the term of office of the President of the United States is an example of this kind. For the future, at least, a calendar of the sort recommended by the Committee would make unnecessary such elaborate directions as to the divisions of time as have been placed in some statutes in recognition of the unsatisfactory nature of the present calendar. The federal statute respecting pay of the Army is an illustration. It provides that monthly compensation is to be considered as one-twelfth of annual compensation and daily compensation one-thirtieth of monthly compensation. Such existing statutory provisons, of course, could be made to conform to the divisions of a new calendar.

B. Whether work-days or week-days are considered, the inequalities among the present divisions within a year are not the only disadvantages. There is a further difficulty affecting business calculations and business statistics because of inequalities between the number of such days in a division of one year and in the corresponding divisions of preceding or following years. This is due to the circumstance that in one year a month may have five Sundays and in the next year may have four. As a

consequence, some months in each year, these months varying from year to year, spread into six weeks. In 1927 and 1928, for example, January contained five Sundays but in 1929 it will have four. In 1928 September and December extend into six weeks, and in 1929 March and June will extend into six weeks. The reasons for this failure of the weeks to have fixed places in the divisions of the years are stated in the quotation sent out earlier from the report of the Committee of Enquiry. When it is recalled that for many business purposes—such as sales by retail stores, the passenger business of transportation companies, and hotel business—the days of the week have materially different values, it is apparent that the present changing relation of the weeks to the divisions of the year in which they occur seriously impairs the accuracy of attempts to compare business results in weeks or months of one year with those of another year.

The Committee accordingly recommends that the weeks should be so fixed in relation to the divisions of the year in which they occur that there may be increased comparability between business results in a division of one year and business results in the corresponding division of other years.

C. *International Conference Proposed*: The members of this Committee have individual preferences respecting the two plans, and a majority favor a plan for thirteen months of 28 days each. But a majority of the Committee believe also that the time is not yet ripe to suggest that the Chamber commit itself to a choice between the two plans. The Committee believes that decisions should now be attempted only upon the question whether or not the present calendar has such serious defects that it should be altered and respecting the method which should be followed in determining any changes. In modern times of vast international commerce, and of rapid and constant communication and travel, uniformity in calendar among the principal nations is the most important consideration.

When the demand for reform in the calendar has reached such volume that action is to be taken, the action therefore should be upon the part of an international conference. Such a conference could take into account considerations of a religious character that may be advanced in some countries and can work out a plan for change to be put into effect at the same time in all countries which have common interests. Recognition of these factors led the International Congress of Chambers of Commerce, which preceded the International Chamber of Commerce, to adopt resolutions as early as 1907 in advocacy of an international conference with respect to the calendar.

The Committee accordingly recommends (1) *that the present calendar should be changed, and* (2) *that the government of the United States should participate in an international conference called to formulate a plan for calendar reform.*

IMPORTANCE TO BUSINESS[4]

In most lines of industry and commerce the individual days of the week are not of the same value. The best illustration is that of a factory which works only half-days on Saturday. Comparisons between months of five Saturdays and months of four Saturdays are obviously inaccurate. If production in a certain plant were uniform throughout the year 1927, the monthly output in March would show an increase of 19 per cent over February, April output report would show a decline of 6 per cent from March, and the May report a decline of 6 per cent from March. If no adjustments were made for these variations, the plant manager would obtain a false impression of the state of his business.

Take the hotel business as another illustration: Thursday is the best day of the week for the hotel

[4] From article, Revision of Present Calendar Needed, by M. B. Folsom, Eastman Kodak Company, Rochester, N.Y. *Paper Trade Journal.* 88:61-3. January 24, 1929.

business, the average receipts on Thursday equaling 18 per cent of the receipts of the week, while Sunday receipts are only 7 per cent, and Saturday receipts 10 per cent of the receipts of the week. This variation in the number of the days in the month and the difference in the value of the days of the week cause a fluctuation in the value of the months of any one year and also in the value of corresponding months of different years.

Using 1926 as an illustration: If January were considered as 100, February would have a value of 93.5, March a value of 106.5, April 102, May 100, etc. If the hotel manager made no adjustment for these variations, he would get a wrong conception of the course of his business. He would probably make allowance for February, but it is doubtful whether he would make allowance between March and May, for instance. If no allowance were made and if his business were uniform during the year, he would get the impression from the monthly report that the business had declined 6 per cent from March to May and that it had increased 14 per cent from February to March.

The department store gives another good illustration of the difficulties caused by these defects in the calendar. Saturday is the most important day for department stores, Saturday bringing in 22 per cent of the business of the week. In March of this year there were five Saturdays, and in March of last year there were four Saturdays. If a department store manager made no allowance for this fact, he might have obtained a wrong impression as to the actual business increase, this March over last March.

The second defect of special importance to business, is the fact that the month is not a multiple of the week, which causes the occurrence of fractions of a week in a month. All accountants are familiar with the split-payroll difficulty and with the erratic course of the burden and cost statements owing to the fact that some

months have five pay-days and others only four pay-days. This variation in the number of pay-days upsets comparisons not only between months of the same year, but also between corresponding months of consecutive years, because the month does not always have the same number of pay-days in different years.

It is obvious from the illustrations given that, if adjustments were not made for the variations in the number of days and the number of weeks in a month, all monthly reports would be misleading and inaccurate comparisons would be obtained. If adjustments are made, additional clerical help is required.

Of course, any calendar change would cause a certain amount of inconvenience in the first year or two after its adoption because there will be difficulty in making comparisons between the months of the new calendar and the corresponding months of the old calendar. In this respect a calendar change would not be very much different from a change in the accounting system of a plant. All anniversary dates, birth dates and holidays would be changed, but there would be little actual difficulty in determining the new dates from an adjustment table.

There would be no legal difficulty encountered. All that would be necessary, following an international agreement through delegates of the various countries, would be an act of Congress stating that such a calendar would take effect on a certain date probably two or three years in advance. This act would include, as a part of it, an adjustment table and would provide that dates on existing bonds, mortgages, leases, contracts, etc., would be automatically changed to the corresponding dates of the new calendar as determined from the adjustment table. It would therefore be unnecessary actually to recall all bonds outstanding and have the old dates erased and the new dates put in; the maturity date under the new calendar would simply be determined by reference to the adjustment table.

The inconvenience and difficulty which would be experienced during the first two or three years of the revised calendar are slight when compared with the many advantages which would be obtained in the business, social and religious world.

Many people will probably say that, however desirable and beneficial, there is very little chance of a change actually being made in the calendar. This, however, is not the case. It is surprising the extent to which sentiment has already developed in favor of calendar revision. The National Association of Cost Accountants, 4,300 members, has officially endorsed the proposed 13 months calendar, and such labor bodies as the International Association of Machinists have added their approval. The Canadian Government Advisory and Technical Commission states that it "endorses the principle of calendar reform and prefers 13 equal months to the year, 28 days to a month or four weeks." Among prominent Canadians who have endorsed the 13 months calendar proposal are Senator R. Dandurand, president of the Senate of Canada and ex-president League of Nations, Sir Henry Thornton, president Canadian National Railways, E. M. Beatty, chairman and president Canadian Pacific Railway Company, Tom Moore, president Trades and Labor Congress of Canada.

Among the prominent men who have favored calendar change and specifically the 13 months of 28 days plan are:

Pierre S. duPont, chairman General Motors Corporation; Gerard Swope, president General Electric Company, New York; W. C. Teagle, president Standard Oil Company, New York; August Heckscher, banker, New York; William Wrigley, Jr., chairman William Wrigley Company, Chicago; T. Edson White, president Armour & Co., Chicago; Otto H. Kahn, president Kahn, Loeb & Co., New York; C. E. Mitchell, president National City Bank, New York; John McEntee Bowman and E. M.

Statler, executive heads of two of the largest hotel systems in the United States; E. A. St. John, president National Surety Company, New York; L. F. Butler, president The Travelers Insurance Company, Hartford, Conn.; William Fox, Fox Studios, New York; W. W. Atterbury, president Pennsylvania Railroad Company, Philadelphia; Samuel M. Felton, chairman Chicago Great Western Railway, Chicago; J. E. Gorman, president the Chicago, Rock Island and Pacific Railway Company, Chicago; John D. Larkin, Jr., Larkin Co., Inc., Buffalo, N. Y.; C. A. Whelan, president United Cigar Stores Company, New York; H. T. Parson, president F. W. Woolworth Company, New York; Robert Dollar, Dollar Steamship Line, San Francisco, Cal.; L. A. Osborne, president Westinghouse Electric International Company, New York.

A letter of special interest came from the Gardner Publishing Company, of New York:

> For many years we have favored calendar change on account of the peculiar conditions obtaining in the publishing business, particularly with magazines. We have two magazines, both of which encounter serious bookkeeping difficulties because of the present calendar. The weekly magazine is published on Monday and is billed as of that day. Our pay-roll is dated on Saturday; we, therefore, have the difficulty occasionally of having five pay-rolls in a month with only four issues of the magazine. Other times we have five issues in the month with four pay-rolls. The result is that it is almost impossible for us to make valid comparisons between months.

It is not general public knowledge that more than sixty industrial concerns in the United States and Canada are already using 13 period calendars of their own, among them being two that have used this method of handling their accounts and records for over 30 years.

A few of these concerns are: American Sales Book Company, Ltd., Elmira, N. Y.; L. L. Brown Paper Company, Adams, Mass.; F. N. Burt Company, Ltd., Buffalo, N. Y.; Cellucotton Products Company, Neenah, Wis.; Champion International Company, Lawrence, Mass.;

Chemical Paper Manufacturing Company, Holyoke, Mass.; T. Eaton Company, Toronto, Canada; Fiberloid Corporation, Springfield, Mass.; International Textbook Company, Scranton, Pa.; United Press Associations, New York; Loew's, Inc., New York; Life Publishing Company, New York; Mercury Mills, Ltd., Hamilton, Can.; Motion Picture News Company, New York; Newton Paper Company, Holyoke, Mass.; John P. Smith Printing Company, Rochester, N. Y.; Southworth Company, Mittineague, Mass.; Crocker-McElwain Company, Holyoke, Mass.; Springfield Glazed Paper Company, West Springfield, Mass.; The Upson Company, Lockport, N. Y.

The thirteen period system is operated as follows:

Each ordinary year has one extra day beyond 13 months of 28 days and leap year has two extra days. The method of taking care of these extra days which is used by the majority of firms is to let these days accumulate and insert an extra week in the thirteenth period every six or seven years. For instance, in the case of a calendar adopted this year, the thirteenth period would end on December 29, and the work calendar for 1929 would commence on Sunday, December 30, 1928. Another day will be accumulated in 1929, so that the work calendar for 1930 will commence on December 29, and so on. It will, therefore, be necessary in 1932 to have five weeks in the thirteenth period. This extra week will be necessary every five or six years, depending upon whether there are one or two leap years in the period. This means that in the fifth or sixth year the thirteenth period will not be comparable with the other periods, and allowance will have to be made for this in comparative statements. This method has an advantage in that the period would always begin with the same day of the week and always end with the same day of the week.

The outstanding benefit of the 13-period calendar is that all months are comparable without any adjustment

being necessary for the unequal number of days or the unequal number of weeks as found in the ordinary 12-month calendar. The advantages of "more accurate cost and production records," "elimination of split payrolls," "assisting budgeting," "having every closing on the same day," "having the end of the week coincide with the end of the period," and "the more effective planning of clerical work in closing the books owing to more efficient scheduling," are among points emphasized by those who employ the 13-period system.

The operation of the 13-period plan in the printing establishment of John P. Smith, Inc., Rochester, N. Y., has resulted in their rendering statements to their clients every four weeks instead of every month, and they have succeeded in inducing the concerns from which they purchase materials—such as paper, electrotypes and halftones—to render them statements every four weeks. They have eliminated fifth-week payrolls from their accounting, with economy in bookkeeping expense, and altogether produced a uniformity of cost and production averages that simplifies the task of making true comparisons of the course of their business.

Aside from the benefits derived from simplifying interior business operations, the 13-month calendar would benefit the printing industry in another important way.

It should increase your business. When the new calendar is in general effect all monthly periodicals would be issued thirteen times a year instead of twelve.

There will be an increase in the amount of printing of bills, statements, etc.

PRODUCTION GEARED TO THE THIRTEEN MONTH CALENDAR[5]

Proposals to change the present calendar have reached a stage where concerted effort is being made

[5] By L. J. Stewart, Comptroller, Western Clock Company, La Salle, Illinois. *Factory and Industrial Management.* 77:469-70. March, 1929.

to determine whether public sentiment favors such a move. It may be of interest, therefore, to set down the Western Clock Company's experience with the 13-month calendar particularly in view of the fact that we adopted it 37 years ago and have been using it ever since.

The purpose of a calendar is to measure time. It is unfortunate, then, from a business standpoint, that the 12 units of the present calendar are unequal in length, that the month is not a multiple of the week. Compare February in an ordinary year with a 31-day month. There is a variation of 11 per cent. Working days in a month may run all the way from 21 to 25—a variation there of 19 per cent. When you consider that most reports in business are compiled monthly, it becomes obvious that these variations constitute serious defects in our present method of keeping track of time. Laborious calculations must be made in order to afford a means of comparison. And even then the picture is not a true one because in any operating statement there are many items that cannot be allocated correctly on a percentage basis.

It was a desire to make quick and accurate comparisons of past and present performance in order to plan intelligently for the future that led us to adopt a 13-month calendar. Such comparisons can be made readily when each month contains 28 days—when, except for holidays, there is precisely the same number of days in one month as in another.

So notable has been our success with operation on a four-week basis that we have never considered returning to the old method. The 28-day month allows for flexible accounting. Each month is constant, invariable, uniform. No longer are our comparative financial reports full of unfortunate "ifs" and "buts." Picture a financial statement, a profit and loss statement showing comparisons with previous periods without the necessity of reconciling reports. Such statements are possible when the year is divided into 13 equal periods. We can compare March 1929, or rather the third period of 1929,

with the same period in 1928 or any other year, and know that there is an equable basis for comparison.

We use the 13-month calendar for all internal records. The plant is run on a budget system. The planning department estimates sales over a given period and divides the estimates into manufacturing cycles of 24 working days each. On that basis production requirements are estimated, manufacturing schedules are set up and followed.

Purchases are governed by these production cycles, by inventories of materials on hand and by prevailing market conditions.

One important advantage of our system is that we can conveniently plan a complete turn-over every 24 days. Which means that capital is tied up 48 days instead of 60 as it would be if we operated on the usual monthly basis. Because of the accuracy with which production schedules can be planned, it is possible to follow them with great exactness. Each foreman knows just how many clocks or how many parts his department should produce each day, and makes every effort to complete the task laid out for him.

We work on a 5½-day week. The pay-roll is closed out every two weeks, the office and factory pay-rolls alternating. Employees have been taught to look on every second Saturday as "closing up" day. This practice has an interesting psychological effect. If holidays have interfered with schedules and curtailed production, the extra effort needed to complete schedules and to bring about this closing up is put forth without complaint. Each workman knows he has a certain stint to finish, and he finishes it.

In budgeting expenses departmentally and functionally it is extremely helpful to know that, barring holidays, monthly budgets will be the same. Some 80 departments are budgeted yearly and each budget is then broken down to cover the 13 periods. Right here we

save a tremendous amount of work. How much more difficult it would be if we had to set up 31-day, 30-day and 28-day budgets for each of those 80 departments and for each of the dozen or more classes of expense in each department.

Of course, as long as everybody else uses a 12-month calendar, we must forget our 13-period year in our external relations. This applies to the credit division, sales department and so on. In these departments internal records are kept on the 13-month basis, but bills are sent out, collected or paid at irregular intervals during the period. Merchandise is billed on the date of shipment, and as our terms are 30 days, the 13-month calendar is disregarded. Likewise, it does not affect the handling of bills payable. Cash discounts are taken and bills paid at irregular times. There is no need of making special arrangements with vendors to send statements according to our calendar, because we pay all bills according to the terms of sale and book all purchases on receipt.

For obvious reasons we still use the dates of the 12-month calendar in all correspondence with the trade. "Second period 15" instead of February 10 would mean nothing at all to outsiders. Indeed, we conduct our business in such a way that those with whom we deal do not know whether we use a 12- or a 13-month year.

In setting up a calendar like ours, there is the question of what to do with days over and above the 28 which we use. The answer, of course, is that we carry them over into the following period. For instance, our 1929 calendar began on December 30 and the first period ended on January 26. The remaining days in January and the first 23 days in February constituted the second period. That is, the second period began on January 27 and ended on February 23. And so on, throughout the year.

That accounts for everything except the 365th day in an ordinary year and the last two days in each leap

year. We simply let these days ride until six years have elapsed or until the extra days form a full week. Then we slip in this week during the vacation period which falls in July. In 1924, the last time we had to make this adjustment, our sixth period began on June 15 and ended five weeks later on July 19. That is really our only calendar irregularity, and it is due to the fact that we have to convert a 12-month calendar into one having 13 periods. If the 13-month calendar were universally adopted, such an adjustment would be unnecessary. In the Cotsworth plan, for instance, the extra days are cared for by dating the last day of the year December 29 and calling it an eighth-day extra Sabbath ending the last week. In leap years, leap-day would be another eighth-day extra Sabbath dated June 29.

An interesting point about our 13-month calendar is the effect it has on the community as a whole. Since pay days fall on regular Saturdays, employees have acquired regular buying habits, and—what is more important—have learned to pay their bills more promptly. Many of the local merchants make a practice of sending out their bills not on the first of the month, but on pay day. If we paid as other concerns do, on the first and 15th of each month, employees would wait until the Saturday following pay day to pay their bills, and the merchants would be affected somewhat in consequence. Collections would undoubtedly be slower.

Summing up, the 13-month calendar presents no difficulties. Its chief advantage is that it facilitates the presentation of comparative reports. Numbered among its benefits are more accurate cost and production records because of the greater ease and accuracy with which production can be scheduled, absence of split pay-rolls, more effective planning of clerical work in closing the books. In our experience it has saved an immense amount of time, heartache, headache and numerous other aches, all the way from cost clerk to president. We often

wonder why other concerns stick to the old-fashioned way of measuring time. Presumably it is because they do not appreciate the advantages of the 13-month calendar. If they tried it, I honestly believe they would never have any other.

IMPORTANCE TO GOVERNMENT[6]

In contrast to the individual business viewpoint let us consider for a moment what the proposed change would mean to the biggest and most comprehensive business of all, namely, the governments of the civilized countries of the world. Take the United States government, for instance, undoubtedly the "biggest business" in existence. Consider its Department of Commerce which, under Secretary—now President-elect—Hoover, has been furnishing the business world with weekly and monthly information on conditions and trends both here and abroad—a service which has had a large part in building up the stability and prosperity of the nation and which, in view of the enormous expansion of business in recent years, is already faced with the need of providing even more exact information than it has hitherto been able to provide. And this more exact service cannot be completely rendered until the sources of information of the Department of Commerce are based upon a calendar in which, in the words of Doctor Burgess, Director of the Bureau of Standards, "nominally equivalent periods of time are actually equal and comparable." The lack of such a calendar seriously inflates monthly export and import totals, because of our unevenly recurring twenty-ninth, thirtieth and thirty-first days and the consequent fifth Saturdays and Mondays which inflate totals as much as 10 to 13 per cent.

[6] From article Progress Toward Calendar Simplification, by Isabel Keith Macdermott, Managing Editor, Bulletin of the Pan American Union. *Bulletin of the Pan American Union.* 62:1234-42. December, 1928.

Consider the Treasury Department with its government pay envelopes, its interest-bearing bonds of many classes, its Treasury certificates and notes, and the consequent strain of its daily, monthly and quarterly payments under the actual uneven-period calendar, and the enormous easement to this strain which would result from the adoption of a "fixed" calendar of 13 months of 4 weeks each! Consider the Department of the Interior with its manifold ramifications and the endless and expensive adjustments now required in the calculation of pensions, salaries, interest, insurance, leases and rents, because of the lack of such a calendar. In the Department of Labor, also, the unequal length of our present months, quarters and half years is a constant source of confusion and uncertainty because the number of working days—the important factor in all labor—is constantly changing. Indeed, Hon. James J. Davis, Secretary of Labor, has but recently quoted and indorsed the statement of his Commissioner of Labor Statistics, Mr. Ethelbert Stewart, that:

> No one thing would be so helpful and reduce the cost of gathering labor statistics to the same extent as . . . the simplification of the calendar, making each month of the year the same length.

In general, there is not a department in this "biggest of all big businesses" which would not be benefited, whose work would not be improved and expedited, and whose operating cost would not be decreased by the proposed calendar simplification, which, it is authoritatively estimated, would automatically release as much as $1,000,000,000 not to mention the saving in time and other important elements. And it is not irrelevant to emphasize here the fact that time saved inevitably results in an increased margin for individual recreation, a margin still further enhanced by the fixing of holidays on Monday—not the least of the benefits of the Cotsworth calendar—thus giving all workers, each holiday, two days of rest and recre-

ation with their families. This has been well expressed by Mrs. Franklin W. Fritchey, president of the National Housewives' Alliance—that enormous and fundamentally significant part of the American body politic—in a recent statement which reads in part as follows: "The arrangement of all holidays on Monday will be a great step forward by giving more time for rest and recreation . . . which will reflect more happiness in the home, and anything that makes for happier homes makes a happier world in which to live."

Nor is the movement in question limited to the industrial and business world. It appears to be equally favored in the rarer atmosphere of science, both pure and applied, for the National Academy of Sciences, the official advisor to the United States government in scientific matters, placed itself on record February 23, 1928, by a comprehensive resolution of which space permits the quoting of only the following:

> . . . *Resolved,* That the National Academy of Sciences of the United States of America favors a change in the present calendar looking to the establishment of 13 months per year grouped so that the last 13 days of June and the first 15 days of July form the proposed new month, the odd three hundred and sixty-fifth day being designated as "Year Day," and permitting among other things the establishment of a fixed date for Easter Sunday.
>
> *Resolved futher,* That these resolutions be made a matter of record in the academy for use in case the academy is called upon for an opinion either by the United States Government or by bodies interested in the revision of the calendar.

Finally—to return to the first paragraph of this article—it is seen that with the creation of the national committee the question of calendar simplification becomes a national issue. Shall it be done? If so, how? And when? Existing public sentiment would seem to indicate an affirmative reply to the first question. As to the second, the facts assembled in this article indicate a strong predisposition in the business, financial and industrial fields in favor of the Cotsworth plan, with its 13 equal

months of four weeks each. The answer to the third is clearly suggested by the national committee itself in the following words: "The nearest convenient year for putting a new calendar into effect is 1933, in which January 1 falls on Sunday." In other words, the first day, week, month, minute and second of that year will begin together. Moreover, that is the nearest convenient and logical time for calendar change from the viewpoints of the naval observatories of England, France, Germany, Spain and the United States, which work several years in advance preparing the exhaustive international and statistical data for the calendars in use in these and other countries.

SCIENCE NEEDS THE THIRTEEN-MONTH CALENDAR[1]

Statistical analysis is that branch of science which enables the trained student to impersonally investigate and disclose the complex and obscure relationships between thousands and even hundreds of thousands of fluctuating values which are influenced by numerous causes producing changes. Whenever time is one of the variable elements, as in the case of solar and meteorological observations, crop production, health statistics and the incipiency of many diseases, the calendar used in summarizing the data is of great importance.

Only a little more than twenty-five years have elapsed since the science of statistics has been put upon a beautiful and exact analytical basis by the contributions of a long list of eminent mathematicians, such as Charlier, Thiele, Pearson, Yule and others. Armed with the powerful tools of analysis and research thus supplied, a student is discouraged at the outset to find that the data he must use has already been summarized by the present

[1] By Dr. C. F. Marvin, Chief of United States Weather Bureau. From pamphlet *Do We Need Calendar Reform?* by George Eastman. p. 49-52. Rochester, N.Y. 1927?

calendar in unequal monthly and seasonal units. Here at the outset of his research is a false or artificial cause of fluctuations which he must allow to mar his conclusions, or a very great task must be undertaken to recompile new summaries from the original observations.

The inequality of its months is by no means the greatest fault of the Gregorian calendar. The month is quite too long a unit for many civil, social and scientific purposes. The week and the fortnight are both necessary smaller units, but for statistical research they must both be aliquot parts of the month, the season and the year, as well as stand in simple multiple relations to each other. No twelve-month calendar of any kind can possibly satisfy all the above prerequisites. The International Fixed calendar, however, does satisfy all these statistical prerequisites in a very complete manner. In fact, these statistical exactions are just the things which guide Mr. Cotsworth in his reform of the present calendar.

A few examples will help to force home the importance of the statements made above.

Fully ten years ago the increased length of many records then available made it opportune and desirable for the United States Weather Bureau to compute new values of the daily normals of maximum, minimum and mean temperature at many stations. At that time the 13-month calendar was almost unheard of in public circles. The problem of the normals from fifty years of daily observations at more than one hundred and fifty stations is a question of the scientific analysis of over five-million individual temperature readings. All of these had been summarized in unequal monthly groups of the Gregorian calendar. The worst part of it was that the months were not only unequal but were too long a unit to satisfy the statistical standards such a great problem demanded. Here was a dilemma with two horns. Either a great piece of work must be poorly done because

of a bad 12-month calendar, or much time and labor must be expended in a *de novo* computation from the original observations of new averages on a standard schedule of 52 weeks to the year.

Notwithstanding the great additional labor it entailed, the computations were all carried out on the weekly basis, and the present temperature normals of the United States Weather Bureau are not free from the technical errors due to the unscientific calendar we continue to use.

Meteorology can supply many instances where the incommensurate relations between the present time units is wasteful of time or productive of crude and unscientific results. Forty years ago the Weather Bureau began the publication of weekly summaries of weather conditions for agriculture. This schedule of weeks must be shifted one day in advance each year and two days in leap year in order to keep in step with the civil calendar. Not only is needless work required to make the necessary adjustment, but the relations of the week to the solar and astronomical causes, which control the weather, change with each adjustment and impair the comparability of weeks in different years which seem to correspond but really do not.

The mysterious cycle of sunspots is a subject of constant statistical investigation by scientists. What sound conclusions can be drawn from tables of sunspot numbers, areas, etc., when February with only 28 days is sandwiched between January and March with 31 days each, as if all were of equal length?

The science of exact statistics is relatively young, having been put upon a substantial mathematical basis well within the last half-century. Wherever time is a variable element the calendar must give days, weeks, fortnights, months and seasons all in as simple aliquot and multiple relations as possible. The 13-month calendar does this and no other arrangement can. The increasing demands to meet statistical requirements is one of the most weighty reasons for calendar reform.

To those whose daily work brings them face to face with the faults of the present calendar, it seems that only habitual use of it by those who are unconscious of the needless waste it entails can explain how anyone can advocate its perpetuation. On the other hand, only lack of acquaintance with the simple elegance of the 13-month plan, and the scientific and civil benefits that will accrue to all humanity by its adoption, will cause anyone to oppose this reform.

CALENDAR REFORM AND WORLD PEACE[8]

The vision is seen of a new calendar replacing the many differing ones, now in use throughout the world, in India, China, the Mohammedan countries and Africa, as well as the Gregorian calendar of Europe and the Americas.

It is too much to hope that such a calendar would be universally adopted at once, involving as it would the breaking of deeply rooted religious traditions among some peoples, but hope is high that the Gregorian calendar may be replaced by a simpler and more useful one in the not distant future. Gradually, as our world grows smaller, the remaining peoples would adopt it, just as the Gregorian calendar was gradually adopted in Europe and America, until a measure of time common to all the world is attained.

And the vision is also seen of the international conference setting aside one day of the new calendar as "Peace Sabbath" for common devotion by all peoples to the ideal of perpetual peace.

The fact that the nations are being brought to closer interdependence by swifter communication and interchange of knowledge is primarily responsible for the movement. Its leaders in the different countries empha-

[8] From article by Meredith N. Stiles, of the National Committee on Calendar Simplification for the United States. *Advocate of Peace.* 91:241-5. April, 1929.

size that the Gregorian calendar is a clumsy instrument for an economic and scientific world that is busy with activities incomparably more numerous and intense than those of the world of the ancients who devised it. It fails to meet the high standard of efficiency which modern science and modern education demand of every other instrument they use. As a basis of statistics for measuring the progress of trade and for scientific and educational data, it produces inaccurate and deceptive results. A better one, common to all nations, is sought.

Statistics are dull to most people, but in modern times comparative statistics of commerce and industry, health and disease, educational trends, agriculture, meteorological and other scientific phenomena have become of vast importance to successful progress, internationally as well as nationally. They are essential for control and analysis. All the organized processes of civilization use them. To be comparative they must be based on units of time, and there is none of these processes which does not feel the handicap of the unequal months into which our present calendar is divided, because of the difficulty in making accurate comparisons based on these units. Vital and health statistics, weather records, immigration figures, balance of trade variations, are internationally important illustrations.

Dr. E. Dana Durand, director of statistics for the Department of Commerce, speaking at the Economic Conference that was held in Geneva in 1927 said that the American Government attached great importance to the development of economic statistics and to improvements which would enable more exact comparability, which would facilitate business transactions and develop good understanding.

George E. Roberts, banker and economist, in testimony before the House Committee on Foreign Affairs said:

We know few things absolutely. We measure things almost solely by comparison. And it is a serious fault with our statistics that comparisons from month to month with the corresponding month of previous years are not accurate. A month may have five Sundays this year when it had only four last year. We are interested not only in statistics of our own production and trade, but in those of other countries. We study world statistics, and it is important to us that the statistics of all countries shall be on a comparable basis.

Dr. Fred E. Wright, in the name of the National Academy of Sciences, said to the same Committee:

The present calendar because of its irregularity imposes a heavy burden on the scientist.

Joy Elmer Morgan, Editor of the *Journal of the National Education Association,* said to the Foreign Affairs Committee:

If we could adopt a calendar that would give us thirteen months of equal length, it would mean that in managing education, which is a giant business involving three billions of dollars in expenditures, that in the human factors involved, we would have comparable units of a given period this year with a given period last year, so that we could get the true facts of this great human business. It would mean that in comparisons of our statistics with statistics of other countries, we would have standards which would make these statistics more valuable. If this great conference is called, America will take her part as a great nation in the advancement of a cause which benefits the human race.

WORLD CONFERENCE TO REVISE CALENDAR [9]

The existence of this favorable sentiment is shown by the large number of communications which I have received from all parts of the country, from individuals and organizations, and by testimony given at the hearings on the calendar resolution which I introduced during the last session of Congress.

The new resolution cites the action of the Pan American Conference at Havana last year in recommending

[9] Text of statement made by Representative Stephen G. Porter, Chairman of the House Committee on Foreign Affairs, in explanation of H. J. Res. 60, 71st Congress, 1st Session. *United States Daily.* 4:502. May 1, 1929.

that all of the 21 Pan American countries prepare for an international conference to determine the best method of calendar revision. Cognizance of the Havana resolution was taken by the Republic of Peru, on February 23, 1929, when a national committee headed by Arch-Bishop Monsignor Lisson was named by the government to study calendar reform.

The present calendar is inadequate for modern requirements in economic, scientific, educational and other spheres of human activity. The calendar's inconveniences have been endured only by reason of custom and tradition which have fixed its use habitually in our lives and which, up to the present time, have kept proposals to improve it from becoming effective.

Universal adoption of an improved calendar would facilitate international intercourse with regard to commercial, scientific, educational and social relations and thereby promote and maintain better understanding, good will and peace.

There are differences of opinion, both religious and civil, as to the best method of change, and they can be adjusted only at an international conference. All these considerations certainly warrant action on the part of the United States, either to propose an international conference itself or to indicate to other nations or groups of nations, which may be considering such a conference, is readiness to participate in one.

The conference ought to be held some time this year because the next convenient year to start a new calendar is 1933, which begins on Sunday, and as much time as possible is needed to prepare for the change. Such action by the United States at this time certainly would serve to hasten it.

This resolution does not commit our government to any particular plan of calendar change. The international conference would consider all plans of calendar simplification and all objections to them, religious and civil.

Religious authorities would, of course, be consulted. From the discussion, the best plan of calendar change would undoubtedly emerge.

NEGATIVE DISCUSSION

INTEREST OF THE ACCOUNTANT IN CALENDAR REFORM[1]

The subject of calendar reform is one to which considerable attention is being given at the present time. It has apparently reached the somewhat dangerous stage when articles of the type appearing in the Sunday magazines are being written regarding it, for the purpose of creating public sentiment in favor of some change which, merely by virtue of its departure from established custom, can be heralded as a reform irrespective of its nature or consequences.

The present calendar, however, is so closely interwoven with a multitude of the details of our modern civilization that no change should be contemplated without serious consideration of its every aspect. It is a matter concerning which accountants should have a very definite opinion, and the expression of that opinion should make itself heard in the council chambers where the question of calendar reform is being discussed.

It is significant that the Babson organization regards the adoption of the thirteen-month year as practically the inevitable outcome of the present deliberations. Accountants should, therefore, be prepared to discuss the necessary implications of this plan and to indicate to their clients what results may be expected to accrue to them individually from its adoption. They should also express and give reasons for their preference for any

[1] From article by Herbert C. Freeman. *Journal of Accountancy*. 43: 161-70. March, 1927.

other measure of reform appearing to them to be more desirable. Literature upon the subject is readily accessible. Unfortunately it relates almost exclusively, as far as constructive thought is concerned, to the thirteen-month-year plan.

The imminence of action of some kind in the direction of calendar reform may be inferred from the fact that the League of Nations has appointed a calendar committee of inquiry and that as recently as January, 1923, the Chamber of Commerce of the State of New York passed a resolution endorsing a bill then in Congress authorizing the President to call an international conference to improve the Gregorian calendar.

It is not intended in this article to present a summary of historical details embracing the period in the development of the human race from the adoption of the moon-month in prehistoric times to the year 1582 when the present Gregorian calendar was made standard for all the countries of Europe owing allegiance to the Roman church, and 1752 when it was adopted by England and her colonies. The historical background is interesting, but its application in the discussion is merely as cumulative evidence that there is nothing sacrosanct in our present calendar, which developed in an arbitrary, indeed capricious, manner. The year alone has astronomical authority to sustain it. The month is totally inexact from the viewpoint of astronomy. The week never claimed any other than Biblical sanction, as distinguished from astronomical justification. For its observance as a measure of time in Europe we are indebted to Constantine the Great.

The so-called Swiss plan makes no attempt to adjust the month to fit the seven-day week, or to make the dates of the days of the week uniform. It aims solely to bring the four quarters of the year into absolute uniformity and to equalize the twelve months as far as possible. Each quarter would consist of three months of 30, 30 and 31 days respectively. The first day of each quarter would

be Monday and the last day would be Sunday. The quarterly calendar would be uniformly as follows:

	1st month	2nd month	3rd month
Mon.	1 8 15 22 29	6 13 20 27	4 11 18 25
Tues.	2 9 16 23 30	7 14 21 28	5 12 19 26
Wed.	3 10 17 24	1 8 15 22 29	6 13 20 27
Thurs.	4 11 18 25	2 9 16 23 30	7 14 21 28
Fri.	5 12 19 26	3 10 17 24	1 8 15 22 29
Sat.	6 13 20 27	4 11 18 25	2 9 16 23 30
Sun.	7 14 21 28	5 12 19 26	3 10 17 24 31

New Year's Day would be an extra-calendar day, as also would the additional day in leap year.

It will be observed that the third month of each quarter, which contains 31 days, is the month which includes five Sundays, so that the number of working days in the month is uniformly twenty-six. It should be noted, however, that the third month also includes five Saturdays which throws it somewhat out of comparison with the other two months for certain purposes. Each month is identically comparable with the corresponding month of any other year, however.

According to each of these plans it is proposed that the date of Easter should be fixed.

Parenthetically, the fact must not, of course, go unnoticed that the treatment of a day as an extra-calendar day does not obviate the disturbance of statistics. A vast amount of activity affecting volume of sales and expenses of business of every kind goes on every day, whether work day or day of rest, so-called. The activities of these extra-calendar days must find themselves reflected in one month or another of the year, which will thus be rendered non-comparable with other months.

Other plans put forward, upwards of one hundred and thirty in all, appear to fall under the category of variations of two methods or else call for the adoption of more or less fantastic features, such as a year consisting of nineteen months of nineteen days each, a year of sixty weeks of six days each, and others of like character. It appears

logical to assume, therefore, that if the calendar is simplified it will be in the form either of the Cotsworth plan or the Swiss plan, with possibly minor variations.

Let it be granted for present purposes that from the point of view of the accountant and the statistician our present calendar, with its absurd month of February, is rather indefensible. One may be inclined to brush aside other objections to the established order of things. Their importance can easily be exaggerated. It is true we have seven months of thirty-one days and four of thirty days. It is equally true that the thirty-one-day months may escape five Sundays and that the thirty-day months may include them. The disturbance caused by five Saturdays in a month also cannot be disregarded in certain industries.

The inequality in the number of working days in the month is somewhat minimized in this country by the fact that four out of the six holidays most generally recognized fall in thirty-one-day months (New Year's Day in January, Decoration Day in May, Independence Day in July, and Christmas Day in December), against two such holidays in thirty-day months (Labor Day in September, and Thanksgiving in November). On the other hand, where Lincoln's and Washington's birthdays are observed, February becomes even more absurd statistically. If Columbus Day in October and Election Day in November are considered (the latter being very widely observed as a complete holiday), the balance remains the same. If Armistice Day in November is observed, the disparity between November and either of the months falling next to it is magnified.

For statistical purposes it is perhaps not entirely equitable to criticize the calendar for the effects of holidays, the dates of which are somewhat fortuitous and which even in an ideal calendar from the statistical point of view might create differences between successive months as great as at present.

It may be interesting to study the actual variations in the months for the cycle of years from 1901 to 1928

inclusive. This period comprises three regular years and one leap year commencing on each of the days of the week, so that it is fully representative. Only the six major holidays referred to above have been considered.

The 336 months in this period can be summarized as follows:

	Excluding February				February		Total
No. of working days per month	24	25	26	27	24	25	
No. of months with 4 Saturdays	8	56	92	36	22	5	219
No. of months with 5 Saturdays	8	48	48	12	..	1	117
Total	16	104	140	48	22	6	336

If the variation between a four-Saturday and a five-Saturday month be disregarded, 191 out of the 336 months, or about 57 per cent, can be compared on an even basis with the corresponding months of the previous year, the difference in the remaining 43 per cent never exceeding one day or, say, 4 per cent. If the five-Saturday variation is a ponderable factor, only 112 out of the 336 months or exactly one-third can be compared on an even basis with the corresponding months of the previous year.

The discrepancy between the individual months and the same months of other years is actually more serious than that between consecutive months or between any two months of a consecutive series of months. Nature and the habits of men imposed by Nature and long established tradition create seasonal differences in the various months to such an extent that the trend alone has any real significance in studying the individual months of the year one with another. This is almost as true of vital statistics as it is of production of automobiles. January and July are not fully comparable in railroad statistics even when reduced to a daily basis, any more than November and December are comparable in chain-store statistics on a daily basis. The monthly trend, one year with another,

however, is important, and in determining this an adjustment must and can readily be made to eliminate variations due to the calendar. Volume, after all, is the one important factor from a statistical point of view affected by the unequal length of otherwise comparable months, and an adjustment in this factor is a simple matter.

One of the strongest arguments advanced by the advocates of the Cotsworth plan for the thirteen-month year in favor of that plan is that it reduces each month to an exact and invariable multiple of a week. It may be well, therefore, to examine into the real importance of this argument.

The purpose of accounting is to determine the results of transactions over a complete cycle of operations. In the vast majority of cases such a cycle is represented by a period of one year—not necessarily a calendar year, but a fiscal year covering 365 days. In some instances a cycle may not be completed within the year, but these are relatively few. In some cases new cycles are started within the year, and if the number started largely exceeds those terminating (e.g., a rapidly growing chain-store business), an end of the year is rather a convenient stopping point for an accounting than the close of a true cycle. The number of industries, or even of individual businesses, in which a period shorter than a year represents a complete cycle is almost negligible. From an abattoir to a zoological garden the variations caused by seasonal fluctuations of activity render any period shorter than a year not fully representative.

Nevertheless, the proper management of a business requires that figures more or less comprehensive in character be made available at frequent intervals. In some businesses the week represents a minor business cycle. Disregarding seasonal variations, the week comprises the shortest unit which is complete in any real sense. This is especially true of retail business, and in certain other industries, such as the packing industry, the use of the

week as a definite unit for interim accounting is entirely practicable. The preparation of weekly operating accounts on an approximately accurate basis is desirable in such cases.

In nearly every industry and business, weekly figures afford an important aid to management. Weekly orders, weekly sales, weekly payroll and various other figures of an accounting or statistical nature are studied and form the basis for executive action. In the great majority of businesses, however, the preparation of weekly accounts would serve no useful purpose even if it were practicable. In most businesses monthly accounts in reasonably complete form, based almost invariably on book inventories, are sufficiently frequent to serve all the purposes of management. Factors controllable from day to day and week to week are watched through the medium of the daily and weekly statistical figures. Policies depending for their shaping upon more complete accounts are not subject to such rapid change that monthly accounts will not serve as the necessary index, supplementing the weekly figures.

Neither is it necessary in any sense that the monthly figures represent the summation of any given number of weekly statistical figures or accounting details. To use a crude metaphor, the weekly figures as used by management need not be regarded as so many companies, a certain number of which form a monthly battalion of figures. The weekly figures are rather the scouts, the outposts, the intelligence-department men. They are included in the whole but the whole need not be an exact multiple of them. The accounting procedure in the preparation of monthly accounts is very little simplified if the months are exact multiples of the week. Except for the accrual of portions of weekly payrolls, the inconvenience caused by a monthly closing in, rather than at the end of a week is hardly felt except by some retail businesses (generally of the chain-store type) where receipts from sales and

certain branch expenses may be reported only on a weekly basis.

The twelve monthly closings in themselves are simply convenient stopping points throughout the year which enable a comprehensive survey to be made of the current trend and justify certain estimates or assumptions regarding the probable results for the year. The months all differ substantially one from the other in nearly every business and yet no one month represents a completed cycle in itself which can be regarded as standing alone. Each month may be treated as a new step forward in a moving annual total or as forming one of a cumulative number of constituent parts (not equal fractions) of the current year.

From this point of view it is doubtful whether anything would be gained by a closing at more frequent intervals throughout the year. No appreciable gain in the implements of management would result from thirteen closings rather than twelve.

On the other hand, accounting expenses in every business of any magnitude would be substantially increased. Only in cases in which the size of the business was sufficient to keep fully occupied the several individuals engaged in handling the various classes of work into which the accounting detail of a business naturally breaks up, would this additional closing be absorbed without extra expense. In every well organized office the force is adjusted as closely as possible to cope with the daily detail and to handle with it the added volume of work, which is spread over a longer or shorter period at the beginning of each month, arising out of the monthly closing. The better managed the office, the less likelihood is there of the additional eight and one-third per cent of monthly work being absorbed without increased force and resultant payroll.

This inevitable expense becomes very much heavier if semi-annual and quarterly statements are required. It

is a very common thing for complete accounts to be prepared half-yearly and in many instances physical inventories are taken for this purpose. In the case of accounts kept on the basis of book inventories it is quite customary for quarterly statements to be rendered. The New York stock exchange is now requiring that quarterly accounts be furnished to it wherever this is permitted by the nature of the business of a company whose securities are listed on the exchange.

In every case where half-yearly accounts were required, fourteen closings would have to be made during the year, and in case quarterly statements were required sixteen closings would be necessary. The closings at the quarterly periods would come within a week of the regular monthly closing—an almost impossible situation to handle in a business of any size.

In using the word "closing" in relation to monthly accounts it is not the intention to signify a physical closing of the general books. There is involved, however, the closing of all subsidiary records, with the attendant ledger postings, the computation of costs for the determination of cost of sales and the work incidental to the preparation of accounts whether carried on to the books for permanent record or made only on working papers.

It is rather inconsistent on the part of those advocating the thirteen-month year to brush aside this objection to their method as of no consequence. It is a factor which every accountant will recognize as one of considerable importance. In strange contrast is the estimate made of a yearly saving of $30,000,000 in the United States alone resulting from the thirteen-month-year plan by avoiding the time and money wasted in searching for and referring to calendars and in drafting, advertising, printing and law costs of such phrases as "Tuesday after the 1st Monday," etc.

A number of other inconsistencies appear in the arguments in favor of this plan, but perhaps one more

example will suffice to show that the rather extravagant claims made for it will bear investigation. In *The Nation's Business* for April, 1922, Mr. Cotsworth is quoted as saying, "Five Saturdays each were in January, April, July, October and December, 1921, when housekeepers were forced to buy a fifth week's provisions out of equal monthly incomes. Many thus trend to get behind in the payment of their bills. It has been figured out that 13 per cent of retail losses in bad debts are due to the differences in the number of Saturdays in the month." What percentage of such retail losses arise from the fact that vast numbers of people are paid weekly and yet are required to pay rent monthly, does not appear!

Another argument of doubtful validity urged by the sponsors of this plan is that the settlement of accounts every four weeks instead of monthly as at present will lead to a quicker turnover of capital and thus release vast sums for other more productive purposes. It does not seem to be regarded by them as an offset that the capital released in the hands of one party to the transaction calls for additional capital to be provided by the other party. The gain would appear to lie almost entirely in the earlier withdrawal of currency from the pockets of weekly wage earners in liquidation of monthly debts—surely a rather inconsiderable factor.

It is submitted that the case for the thirteen-month-year plan is not sufficiently convincing to appeal to accountants.

If any simplification of the calendar is necessary—and the shortcomings of the present system would almost justify such a conclusion—the Swiss plan appears to afford substantially all the benefits of actual importance to be derived from a change, and it is not subject to the objections here raised against the thirteen-month-year plan. In the opinion of the writer, the Swiss plan, if any, is the one to which accountants should give their support.

One may be permitted to suspect that if the wandering date of Easter could be arrested, even if only to the

extent of confining it to the space of seven days from say the eighth to the fourteenth of April under our present calendar, a great part of the demand for calendar reform would cease. (A fixed date could, of course, be set for Easter under the Swiss plan equally as well as under the Cotsworth plan.) On the other hand accountants in this country can hardly be expected to rest until something is done to increase the interval between December 31st and March 15th.

CALENDAR REFORM[2]

It must have come as a surprise, possibly a shock, to many to learn that we may shortly be asked to suffer all the inconvenience and confusion of a catastrophic alteration in the calendar on grounds which seem altogether trivial. In the first place, the calendar months now in use have by long association become enshrined in literature as the very impersonation of definite stages in the seasonal progression and retrogression of natural phenomena, and it would be sheer vandalism to break this association, and renounce our literary heritage, without far graver practical cause than can possibly be shown.

In the second place, every calendar system must be framed with reference to the four natural landmarks of the year, namely, the solstices and equinoxes, and it is eminently desirable that the two solstices, and the two equinoxes, which stand opposite one another in the natural year, should not be assigned dates which are unsymmetrically disposed to one another. In the proposed system of thirteen months, the solstices wolud stand 6½ months or time-units apart, instead of a whole number as in the present system, and no month would be located diametrically opposite another as at present, viz. December to June, March to September, and so on, along the

[2] From article by L. C. W. Bonacina, Hampstead. *Nature.* 111:289-90. March 3, 1923.

earth's orbit round the sun. This arrangement would offend the artistic sense of any one with a vivid appreciation of the fact that our fundamental division of time, the year, is not an arbitrary unit but one based on a grand cycle of Nature.

Thirdly, it is said that meteorologists and astronomers would welcome months with equal numbers of days, and no doubt they would, one and all, if they could order everything to perfection. But apart from the labour that would be involved in preserving the continuity of the climatological record, involving the translation of one calendar into the other, think of the confusion that would arise in making comparisons between two systems which both have the same names of months! We should be perpetually having to think and specify whether it is the old *January* or the new *January* we are considering, and so forth. It would be just as though, when the new barometer unit the *millibar* was instituted to replace the *inch,* the name "inch" had been retained for the new division. Far better would it be to have an entirely new set of calendar names so that the old names would retain their habitual meanings. It is always open to astronomers and meteorologists to invent a system for any special technical purpose for which it may be required; but probably not many of them would take the narrow view and wish to disorganise the world on that account.

MEMORANDUM AGAINST RECOMMENDATIONS[8]

The urgency towards a change in the Gregorian calendar comes to the Chamber out of a reference by the International Chamber of Commerce, following the interest of the sponsoring committee of the League of Nations. It is one of those propositions which, apparently

[8] Minority report by Henry D. Sharpe and Stanley H. Bullard. *Chamber of Commerce of the United States. Committee on Calendar Reform.* Calendar Reform. p. 18-19. Washington, D. C. 1929.

in no way taxing any one nation at the expense of another, and having no political character which might offend, has had an easy launching. It excites the enthusiasm of individuals with minds given to logical expression, and once launched readily embraces the cordial support of well-meaning people who unthinkingly commit themselves to the perpetration of a nuisance. Most questions passed upon in this body relate to questions of fact, but this is peculiarly one in which its advocates are willing to pronounce themselves, offhand, without, we believe, duly calculating the implications.

Generally speaking, the civilized world does now possess, or is rapidly coming to possess, a calendar enjoying substantial uniformity. The infliction of a new calendar having radical departures from the present, or attempting to improve it, would mean annoyance to millions of people, would bring great discomfiture to great sects which view the present calendar with religious loyalty, and would offer nothing of substantial value to any single business which that business cannot enjoy now, if it will.

The daily use of the calendar vitally concerns the intimate habits and views of vast millions of people in this country. The proposal to agitate a reform in the calendar as presented has no popular backing worth mentioning. It comes to this Chamber with the studied support of but few people. A large group has been circularized, and as often happens with catchy ideas, a great many people, many of them of business prominence, are giving this proposal their endorsement, without deep thinking. We have not learned that these people are giving else but lip service towards the furtherance of the idea, though apparently a considerable sum of money is being spent to launch it.

With this in mind, we are opposed to the recommendations of the Committee which, we believe, should not at the present time have the encouragement of the

Chamber. Furthermore, we are opposed to the last recommendation which would seek to encourage our government taking part in a conference on a subject in which the great body of this country not only have a vital concern, but have, as yet, evinced no deep seated interest. When the people themselves, through their accredited representatives, have been led to take an interest in this matter, it may be time for the Chamber to bestow its consideration. Popular interest will be our warrant. Certainly there is no great business need for it. We do not believe the subject is a timely one.

However enthusiastic the proponents of the proposed change may seem to be, general business has little interest. Those who wish to use a system of accounting other than that based upon present months are now doing so. Business, as such, should be careful not to intrude upon matters peculiarly of private concern as well as being interwoven with custom of long standing, unless a change is of a transcending importance to business itself. The Chamber of Commerce can well avoid taking any step to commit itself in this matter.

REFORM OF THE CALENDAR[4]

The only way of making a really satisfactory reform of the calendar, and one to which I think indeed many people have aspired in the past without much success, is to accelerate the sun and retard the moon. If one could only make the year 360 days and the lunar month 30 days, the consideration of an ideal calendar would be a very simple proceeding. The question of the calendar might be regarded as primarily an astronomical one or an ecclesiastical one, but nobody who has had to do with meteorological statistics can be indifferent to any

[4] From discussion by Colonel E. Gold, D. S. O., F. R. S., Assistant Director of the Meteorological Office, at a meeting of the Society on February 21, 1923. *Royal Meteorological Society. Quarterly Journal.* 49: 147-8. July, 1923.

prospect of an improvement which would remove the difficulties which are due to the incongruity between the week, the month and the year:—February with its 28 days—a week in one place in one year and in another place in another year—all make the compilation of statistics very difficult. In the *Weekly Weather Report* of the Meteorological Office in its old form there is a table giving summaries for periods of four weeks. These summaries are not comparable with the monthly summaries and involve separate compilations.

What conditions must the calendar satisfy if it is to be as far as possible ideal from the meteorological point of view? First, we must be able to have a period shorter than the month. We must have something of the nature of a weekly period. It is very desirable that this short period should come in the same position in the course of the year from year to year and not change about, and in the same position each month, so that monthly values can be directly computed from weekly values. It may sound difficult to achieve if you think of the year as it is, but it would be desirable from the point of view of meteorology and would simplify all computations. On this criterion the existing week stands condemned. It is, in fact, a statistical tragedy to continue it in the Meteorological Office publications and in the returns of the Registrar-General. It is also desirable that the week should preserve the same length throughout the year, but this is not absolutely essential. Naturally also it is desirable to have the months as nearly as possible equal. The present system of months cannot be considered on the whole a bad one if February received back the day that Augustus stole from it to make his month as long as the month of Julius Cæsar, and the advantage of having twelve months in the year is one that is not to be lightly set aside. The number twelve enables one to get a quarter, a half and a third without difficulty.

Dr. Marvin has been moved to issue a short circular indicating what he thinks ought to be done by meteorologists to get a calendar to suit their purpose. His proposal is briefly that we should make all the months, months of four weeks; weeks of seven days. That satisfies one of the criteria for an ideal system. It makes the monthly statistics easy to derive from the weekly statistics. He achieves this by having thirteen months in the year, and one day which can be placed, as he suggests, at the end of the year, or, if we preferred it, in any other place; one day out of the ordinary reckoning, in leap year two days. Each 14th day of the month in his scheme would always be a Saturday. That naturally is a very great advantage. One of the greatest disadvantages of this system is the thirteen months. The months do not fall into quarters, and thirteen is an extraordinarily inconvenient number. You could almost carry in your head the necessary sines and cosines for the twelve months or the twenty-four hours, but to carry in your head sines and cosines for harmonic analysis with thirteen months would tax most of us. Dr. Marvin says:

> The quarters by the new calendar would contain exactly thirteen weeks, that is, one week more than just three months. However, each such quarter would embrace exactly 78 working days, and present other advantages in business and financial affairs which quite offset the seeming inconvenience of the fractional months.

No doubt we could get over the difficulty, but it seems to be almost a fatal objection to Dr. Marvin's proposal that his months do not fall into quarters. The French Revolutionary calendar was drawn up by Monge and Lagrange; it lasted for twelve years and then had to be given up. This indicates the difficulty of reforming the calendar except by international agreement.

All schemes put forward hitherto go on the hypothesis that you must have a seven-day week. There is another possible length of the week, and that is six days. If you have a six-day week, Sunday to Friday, and a

five-week month, you still retain twelve months in the year. Weekly statistics would go into monthly statistics quite simply. You have five days to dispose of; a possible way of allocating these would be to have a Saturday every quarter, and two Saturdays in the last quarter. This will not introduce any great variations into the weekly statistics, and it leaves the monthly statistics directly computable from the five sets of weekly statistics. I commend this as a thorough-going reform which would make all computations much simpler and give the other advantages claimed for the reform put forward by Dr. Marvin without any of its disadvantages.

OBJECTIONS TO CALENDAR REFORM[5]

Mr. Speaker, there are approximately 120,000,000 people in the United States and I sincerely doubt whether there are so many as a thousand who earnestly desire the change of the calendar under which civilization has been working for several centuries.

A well-known editor of one of our daily newspapers has expressed this idea humorously but to the point:

> The average citizen does not hesitate to croak and complain about the things with which he is dissatisfied. He is not inclined to suffer any grievance, real or imaginary, in silence, but how often do you find anybody complaining about the calendar. We hear complaints about practically everything else—the weather, taxes, the high cost of living, inefficient government, the local baseball team, street paving, and the low quality of peanuts sold, but when do you ever hear the enraged taxpayer stand up on his hind legs and complain because April has not as many days as July.

Because of the general impression that religious groups have presented the most serious objections to the proposed calendar reform, I wish to bring these objections to your attention in the fairest possible way. We

[5] From speech of Hon. Sol Bloom, Representative from New York, July 11, 1929. *Congressional Record.* 71:(current) 3174-90. June 18, 1929.

must respect every religious denomination in our country and we must not feel that a minority group deserves less consideration than a large denomination, at the hands of those who are attempting "to bring about the advancement of business or science!" Too much is spoken about tolerance and too little about true respect for other religions. I would like my colleagues of the House to understand the objections of some of the religious groups and to realize the very important fact that when all of the details of this calendar reform are understood by leaders in every denomination, there will be a hue and outcry from sources unexpected. To-day the opponents of the bill may seem to be religious minorities, but to-morrow they will be joined spontaneously by almost every group and sect of religion in America.

We have during the past few months been in consultation or correspondence with some of the leading bishops and dignitaries of various Christian denominations, and I know whereof I speak when I declare that practically all Christian denominations will stand in opposition to any new calendar which does not provide for Christian worship on the Lord's Day—the first day of the week as it is now observed.

In almost every instance these ecclesiastics have at first favored the 13-month 28-day calendar, but when they studied the question more thoroughly and realized that it is impossible to change the present calendar without moving the day of worship to a different day of the week every year, they voiced their objections and stated that they will be ready to speak out publicly in accordance with their changed belief. This question is not yet understood generally and therefore many favor it until they comprehend just what the change will mean to their own religion.

I say this, because I wish you gentlemen to realize that the protests are not limited to a few small denominations. I sincerely feel that Congress will hear the thanks

of millions of citizens in this country when it is realized that we have not permitted the trampling under foot for commercial purposes of that which is considered sacred by so many citizens of our country.

You may be aware of the fact that when this proposal was being discussed before the Foreign Affairs Committee, I suggested that in truth we had no right to be considering the question at all. I sincerely believe that I was correct in my statement at that time, and I wish to reiterate my constitutional objection to the whole proposition.

The following are the four points of order which I presented against this House Resolution 334:

(1) There is no rule of the House of Representatives authorizing the Committee on Foreign Affairs, or any other committee of the House or of the Senate, to report or even consider legislation affecting a change in the calendar.

(2) There is no provision of the Constitution authorizing Congress to legislate on the subject of changing the calendar.

NOTE—Article X of the Constitution.

(3) Congress is positively forbidden by the Constitution from making any law respecting any establishment of religion or any law that would prohibit the free exercise of religion. Legislation changing the date of the Sabbath surely affects the religion of hundreds of millions of people, and would positively interfere with the free exercise thereof.

(4) There is no power given to Congress by the Constitution to pass any law that will alter or nullify the laws of any state of the Union.

In taking up these four points in the reverse order I wish to emphasize the fact that the Federal government is not empowered to prescribe changes in the calendar for the states. It could only make its law effective in the District of Columbia, the territories, and territorial

possessions of the United States. A situation strictly analogous to this is the one in which people speak of national legal holidays, yet realizing well that there are, strictly speaking, no national legal holidays in the United States; not even the Fourth of July.

The Federal government has no constitutional power to prescribe legal holidays in the various states. It can make holidays legal only in the District of Columbia and in the territories. Even the presidential proclamation designating a day of thanksgiving each year does not make that day a national legal holiday. For commercial purposes the Federal government, by various acts of Congress, has recognized Labor Day, Christmas, New Year's Day, Washington's Birthday, Memorial Day and the Fourth of July as public holidays. That is as far as the Federal government can go. There is no general statute on the subject. Sometimes the term national legal holiday is loosely applied to holidays such as some of those mentioned above, which have been made legal holidays in every state and in the District of Columbia and all the territories, and which are therefore, in one sense, both national and legal.

By analogy the same reasoning will apply to proposed changes in the calendar. Even if the Federal government should pass the act legalizing the 13-month calendar, not a single state would be under obligation to make the change.

The same situation would apply to any attempt of the Federal government to reverse the calendar. At the present time each state has the privilege of regulating time in its own way. As a matter of fact the states have in general delegated this privilege to the various municipalities. It is, for instance, a well known fact to all of you that any city can decide whether it shall utilize daylight saving time or not. By the same token each city could call what is generally known as noon "3 o'clock" or "6 o'clock" or any other time. In other words, the regulation of time

is entirely within the jurisdiction of bodies outside of the Federal government and the latter can do nothing to alter or nullify the laws of any state of the Union.

Some state legislatures have already exercised their power in this calendar question and introduced bills providing for the thirteen-month calendar. This, however, is folly, because, if these states should adopt the new calendar, the worst kind of confusion would result. Different dates, different days of the week and even different months would prevail at the same time.

How would it be, for example, if in New York it would be Tuesday, May 2, and in New Jersey, across the river, the calendar would read Friday, April 27?

On January 18, 1929, a bill was introduced into the Assembly of the State of New York entitled:

> An act amending section 50 of the general construction law as to time, use of standard, making 364 days in one year divided in 13 calendar months of 28 days each.

In the state of Oregon a resolution pertaining to this subject was introduced on January 21, 1929.

Can you imagine the confusion that would prevail if one of these bills or any bill similar to them were approved by Congress and an attempt was made to have them put into effect?

I call this to your attention particularly because I wish to emphasize two important facts. On the one hand. it indicates the absolute correctness of my point of order that there is no power given to Congress by the Constitution to pass any law that will alter or nullify the laws of any state of the Union; and also because, if calendar changes were attempted according to the correct method and regulations of state procedure, indescribable confusion would result.

The claim that "the present calendar does not register true days of the week" and that the changes made in the calendar by Julius Caesar and by Pope Gregory XIII "stand in the same light as the so-called zero day contemplated in the Eastman calendar" are clearly

unfounded. All historic and astronomical facts bear proof that none of the changes made at any time in the calendar by Ptolemy, Julius Cæsar or Pope Gregory XIII affected the days of the weekly cycle but only the days of the months and the days of the yearly cycle. As reliable an authority as the Encyclopedia Britannica states (page 664 in article called "Calendar," under "Week"):

> The week is a period of seven days, having no reference whatever to the celestial motions—a circumstance to which it owes its unalterable uniformity. Although it did not enter into the calendar of the Greeks, and was not introduced at Rome till after the reign of Theodosius, it has been employed from time immemorial in almost all eastern countries—and those who reject the mosaic recital will be at a loss, as Delambre remarks, to assign to it an origin having much semblance of probability.

The days of the weekly cycle have never been disturbed in any calendar changes which have been made. The Jewish race which has been strict in its observance of the seventh day Sabbath as long as history can recall, has never altered its observance of the Sabbath day on the seventh day of the week.

The proposed blank day plan in the Eastman calendar, as submitted in the resolution I am now discussing, is the first plan that ever suggested a change in the weekly cycle. This plan would make the Sabbath day as well as Sunday a migratory day through the weekly cycle each year, and would in reality make the holy days, which are now definitely fixed, merely fictitious days, robbed of their original religious significance.

This is not a notion limited to Jewish acceptance. The New Testament states that Jesus rose "upon the first day of the week," and that the day preceding His resurrection was "the Sabbath day according to the commandment." If the day before "the first day of the week" was "the Sabbath day according to the commandment" which God anciently delivered to His people and which the Jewish race has continuously observed, we have positive proof that the present seventh day of the week is the same

seventh day of the week it was at the time of Jesus, and as it was at the time the fourth commandment was included in the decalogue at Mount Sinai.

Now, the question may have arisen as to just what differences it will make whether the religious Sabbath is observed on one day of the week or another. In my opinion the measuring of time is not important in itself, but, because of what it involves in our lives.

To have any value a calendar must possess, above all things, the virtue of continuity.

The calendar which omits an occasional day or two, obviously, is worthless for the primary purpose for which a calendar was devised—a means of reckoning time accurately.

True, the omitted day is not literally lost. The sun rises and sets. The hours pass. We live that period.

Yet, if the calendar disregards it, it is a lost day in so far as that calendar is concerned. The very fact that such a day has passed and that we have failed to count it, throws all our chronological calculations, past and future, into confusion.

The variableness of Easter has long been recognized as an inconvenience, not only from the standpoint of the Christian churches, but as a commercial proposition as well.

What, then, shall we say of a "Wandering Sabbath," or a "Floating Lord's Day," not once a twelve-month, as in the case of Easter, but weekly throughout the year?

To be sure, the calendar "reformers" aim at the "stabilization" of a new Sunday, under their plan.

To create a real "day of worship," however, requires more than a law. We may set it down as a foregone conclusion that no mere act of Congress—or even an international convention—setting up an artificial Sunday, will be acceptable to literal-minded religionists.

Probably it would be acceptable enough to a considerable element of people who—without implying any

reflection upon them—are not so strict in their interpretation of rules of orthodoxy. These doubtless would feel that one day of rest and of worship in seven is satisfactory, without insisting upon any particular day in the week for its observance.

Just how public sentiment would be divided in so peculiar a situation is purely a matter of surmise. At any rate, it is a safe prediction that the number of dissenters from any system calling for a changeable Sabbath would be formidable. It might be a majority. It might be only a large minority, but even a minority would frustrate the so-called "reform."

General acquiescence to the plan is essential to its success—Christian acquiescence at least. The Jews never have abandoned Saturday as their holy day. The Seventh-day Adventists and the Seventh-day Baptists never have abandoned theirs. Friday has continued to be the Mohammedan day of worship throughout the centuries.

Under the new system, day succeeds day in normal sequence up to and including the 364th, but the 365th is a cipher—no day at all in the record of the "reformed" calendar. This 365th day, in its place at the end of the initial "reformed year," is, in fact, Sunday. We may safely assume that all strictly orthodox Christians would observe it accordingly. To these orthodox folk the following day would be Monday, but Sunday to those who have accepted the reformed method as their new rule. Yet they can hardly expect their fellow Christians, who have observed the preceding day, to observe a second Sabbath with them. The same confusion would prevail throughout the year. During the ensuing year the official Saturday would be Sunday to the orthodox; the next year Friday; the next Thursday, and so on, with additional complications resulting from the quadrennial mid-year "skip day."

The reformers contend that their plan's uniformity would be of untold commercial advantage. The business

statistician would be able to compare his figures for any desired month with the figures for any other month in any other year in the full certainty that the pair of months are identical in every respect.

This theory might be sound if the statistician could enforce the adoption of his reformed calendar upon those who, as a matter of religious conviction, may prefer to adhere to the holy day of their fathers—which, of course, he cannot do, no matter how effective he may make it in civil law. His records can scarcely be simplified by the addition to his problem of one or two or three weekly "floating Sundays."

Aside from the religious difficulty, it is an open question as to how well the public would be satisfied with the complete dislocation of the world chronology of all historic events—with the confusion of all dates, anniversaries, Independence Days and other occasions, past and future, beyond the power of anyone but an expert mathematician ever to determine exactly again.

A congressional resolution—already pending—requesting the President to take action toward an international conference! The conference itself, under the League of Nations' direction! The adoption of a definite plan and of a date for putting it into effect!

Such is the "reformers'" program.

And then, as expressed in a booklet, "Do We Need Calendar Reform?" nothing would remain but "the ratifying legislation in the various countries."

The pamphlet adds:

> Such legislation, which would be of a very simple nature, would take care of the changes in the dates of holidays, the maturity dates of contracts, and other legal matters.

It does not look so simple to the League of Nations.

According to a report of the League's special committee of enquiry into the reform of the calendar:

> No reform can be effected without the consent of all, or almost all, the important bodies interested, and these cover a wide range—religious, administrative, economic and scientific,

for example. It rests with public opinion to judge of the merits and the practicability of each of these groups of systems. The committee does not believe that it is as yet possible to obtain sufficiently definite statements of the final views of those interested.

Also "legal matters" are matters for the individual forty-eight states. It is exceedingly doubtful whether or not the Federal government has the power to commit them to such a revision of their own laws as would be necessitated by "calendar reform" along the lines proposed.

In short, the issue clearly becomes constitutional.

It is highly improbable that a mere congressional ratification of a "calendar reform" program, requiring so radical a readjustment as the one we are now being urged to adopt, would stand the Supreme Court test.

A constitutional amendment would seem imperative.

All kinds of arguments have been offered in favor of the 13-month calendar, running from the ridiculous to the sublime. We, who oppose the innovation and who claim that there is no great public demand for so serious and radical a transformation, could point out scores of reasons why the 13-month calendar would work to the disadvantage and harm of many individuals and many large groups.

I wonder whether the proponents of the 13-month plan realize that under their scheme public utility corporations would be compelled to have meters read and bills rendered 13 times a year instead of 12. This is no small matter for it would add 8 per cent to the cost of this single item and every business man knows that 8 per cent is a margin not to be disregarded! Do they realize the mounting cost of printing magazines and the additional costs of advertisements which would inevitably result because of the necessity of publishing monthly magazines 13 times a year instead of 12? This one item alone would mean millions of dollars of added expense to the general public, and yet the defenders of the 13-month

plan claim the 13-month calendar would bring economy into business.

Rent payers would note the disadvantage of the new plan very quickly, for they would have to pay the cost of their homes or apartments thirteen times a year. Of course, the proponents of the plan claim salaries would be adjusted accordingly, but I know very well that salaries are slow to follow when the cost of living mounts. Here too, there will be the added cost of making 13 rent collections instead of 12.

Has it been brought to the attention of those who favor the change of our calendar that if their plan were accepted it would become necessary to change every textbook, every encyclopedia, every record, and all histories? The cost would run to hundreds of millions of dollars. Where, I ask, is the corresponding economy that the advocates of this plan boast about?

We must also bear in mind the question of long-term leases and contracts that are in existence at the present time. You will agree with me, if you consider this matter from a legal standpoint, that it taxes the imagination to conceive how tremendous the amount of litigation will be when these leases and contracts are challenged because of the change of calendar dates.

Real estate leases would be invalidated on a wholesale scale. Throughout the country generally a form of lease known as "ground lease," or "99-year lease," is very prevalent. In practically all of these instruments, the rental is reserved on a monthly payment basis, and the entire amount due for the full period of the lease lumped under a direct promise of the lessee to pay that amount, but in monthly installments.

The courts would indeed be confronted with a herculean task in construing these leases. If the courts hold that the leases were executed while the old calendar was in force and with it in mind, the new calendar will be entirely disregarded so far as the terms of the lease are concerned.

Under this construction the parties to the lease and their successors will be required to keep alive for nearly a hundred years an anniversary date of the old calendar so as to make payments in accordance therewith. The practical effect, therefore, is to nullify the new calendar as a working basis for time computation.

On the other hand, if the courts should hold that these leases must be made to conform to the legislative enactment establishing the new calendar, then a patent ambiguity will arise upon the faces of the leases for the total amount of rent so calculated on a 12-month-to-the-year basis, and the addition of an extra month will make two clauses of the lease utterly irreconcilable.

If it is held that the provision requiring a definite amount to be paid each month prevails over the total amount stated in the lease, then it must follow that the law creating the new calendar is unconstitutional for it violates the obligation of contract and imposes upon the lessee a higher rental than he had agreed to pay.

Employment contracts, and in fact all contracts under which compensation or payment is now fixed on a monthly basis, would be seriously jeopardized by the new calendar and their validity brought into serious question.

The proponents of the Eastman calendar argue that it has economic value through the stabilization of monthly payments. But this so-called advantage is theoretical rather than actual. Suppose February is a short month and March a long one. Do not the two equalize each other?

Then, too, there are the trusts and investments and foundations which have been tied up legally with stipulated dates and length of terms that would become too involved for unraveling. I could speak to you for hours about the legal complications and the possible litigation which would follow, were the 13-month calendar adopted.

If the employer must pay the same wage for 28 days in February that he does for 31 days in March, then it is

equally true that he may lease his land for the same amount for the short month as for the long one. Throughout the year the inequality in the months' length equalizes itself, and no one is the loser.

On the other hand, very serious economic consequences would result from adoption of the new calendar. Employers would be quick to cut wages of persons employed on a monthly basis, arguing that the new wage should be not more than twelve-thirteenths of the old, but landlords would be very slow to make a similar reduction in rent, and the monthly wage earner would be indeed between two millstones, with a lessened income and an increased living expense. Other and far-reaching economic upheavals would result.

Furthermore, suppose that some or all the European countries do not adopt the new calendar. Picture the confusion which would result in attempting to reconcile June 17 under the old calendar abroad with June 28 in the United States, bearing in mind that there would be no definite number of days between the two dates but that they would vary for every month in the year and for every day in every month.

Again, let me ask why the calendar must needs receive this drastic overhauling at this time? If some reform is needed, why not direct the attention of the Congress to our obsolete method of weights and measures, which could be replaced by the metric system, now in almost universal use abroad, and which would greatly aid our manufacturers in supplying products to countries where that system is in vogue? There would be a change fraught with no sentimental disadvantages and which would result in great economic good. In any event it seems certain that the calendar which has stood in its present form for over one hundred and fifty years and in substantially its present form for nearly five hundred years should not be torn apart to achieve some doubtful advantage.

I mentioned before that the proposed calendar would cause great confusion and involve much unhappiness by

eliminating sacred and personal anniversaries. The birthday anniversary of at least 10,328,060 American citizens would be entirely lost. This figure is derived by assuming the population of the United States to be 130,000,000, of which number approximately 356,140 have their birthday anniversaries on each day of the calendar year. To lop off 29 of these calendar days—that is, the 29th to the 31st of every month—would deprive more than 10,000,000 Americans of their birthday anniversaries.

A corresponding number of our citizens would lose other treasured days, such as wedding anniversaries and the anniversaries of the death of loved ones.

Every other important date, including all our holidays, would be rendered inaccurate, because, for example, June 28 on the new calendar is not an anniversary of June 28 on the old calendar, but the anniversary of a date some 10 or 11 days earlier.

The above reasons, which may be generally classed as sentimental, are, nevertheless, of tremendous importance when it is remembered how powerful an influence sentiment is in the lives of our people. To tear away from these millions the influence which they have cherished and observed through many generations would be a highly dangerous test of the strength of our social fabric.

How interesting is the fact that when the committee sent thousands of inquiries to persons and organizations throughout the world, the replies showed that although there was some interest in the calendar reform, nevertheless, public opinion was not prepared for a serious change. In fact, many letters were received which displayed little knowledge of the different changes proposed or of universal application. It has been noticed that up to now most of the propaganda has been by organizations interested in a particular scheme to the exclusion of all others. Just as the Eastman organization is backing the

13-month plan of 28 days each, so another powerful group is backing the 12-month plan of alternating 30 and 31 day months. I call your attention to the fact that both of these leading plans for calendar reform include provision for a blank day.

The Jewish calendar during the second commonwealth up to the fourth century is that of the New Testament. The festival of Passover which Jesus celebrated and the Pentecost for whose celebration Paul went to Jerusalem, were according to this calendar. The early Christians, in the first three centuries of the present era, kept the festivals according to the same calendar. Passover was observed after the vernal equinox on the full moon, and Pentecost, on the fiftieth day after Passover.

The early Christians, who accepted Sunday as the day of rest instead of Saturday, did not change the order of the days of the week. They merely changed the Sabbath from the seventh day to the first day of the week, or Sunday. Thus Justin Martyr: "On the first day of the week God made the world, and Jesus Christ, our Saviour, on the same day rose from the dead." In the Apostolic Age some Christians observed both the Jewish Sabbath and Sunday, but the order of the week was kept intact by the Jews as well as by the Christians from time immemorial.

I believe I have given sufficient evidence to prove that never before in calendar changes has there been any interruption in the succession of the days of the week. Perhaps I have gone into too great detail on that angle, but I am under the impression that most people are erroneously informed in this regard.

At the hearings of the Committee on Foreign Affairs the gentlemen who advocated the adoption of the new calendar were very much annoyed by our opposition and claimed that they could not understand our attitude on the question of a blank day. They seemed to feel that there was nothing unusual about skipping days and they

assumed an attitude that we were narrow in our views when we opposed the zero day. There were two arguments in particular which they stressed in trying to tear down our defense of the uninterrupted succession of seven days of the week.

1. The Sabbath cannot be kept and has never been kept at the proper time because we live on a round world.

2. Why should you oppose the institution of a blank day when that is just what Moses did in order to adjust the calendar of his time?

Mr. Speaker, it was unusual to hear learned scientists speaking before the committee of losing or gaining a day in travel around the world. They set forth the contention in varied form, and at some length, that the Sabbath commandment cannot really be kept under the present calendar, if a person crosses the date line.

One savant portrayed the situation that would confront two ministers who might journey in opposite directions around the world to attend a church conference at Manila. He pictured the dilemma that he believed would confront them in adjusting their reckoning of days. Another read a long paper entitled "The Wandering Sabbath," in which he brought out the argument that the Sabbath could not be kept at the same identical moment of time in different parts of the world, and therefore why insist so rigorously on maintaining its identity?

A third scientist summed up the case in a nutshell when he declared: "I would like to throw out this thought with regard to the blank day. Why not leave it a blank day and forget it? Everybody that crosses the international date line either adds or loses a day."

Because this "round-world" argument was employed by the calendar proponents at the hearings and because this argument, if allowed to remain unanswered, apparently nullifies the whole protest over the seventh day, we believe it should be examined in some detail.

We may fittingly introduce our examination of the question with an inquiry as to what the commandment

says is the day of the Sabbath. We read that "the seventh day is the Sabbath." The "seventh day" of what? Of the year? Of the month? No; the seventh day of the week. This point is as obvious as when the Sunday observer says, "I keep the first day," meaning the first day of the week. Of course, we are aware that some may possibly quibble over this understanding of the commandment. But the Biblical and historical value of the phrases "first day" and "seventh day," as signifying the first and seventh days of the week, is so overwhelming that we may properly ignore any captious objections. In other words, the man who wishes to obey most literally the Sabbath injunction needs only to make certain which is the seventh day of the week.

With this basic proposition in mind, let us consider now the admissions of the scientists themselves. They testified that they had no knowledge of any changes in calendars throughout the centuries that had in any way affected the reckoning of the days of the week. From this we conclude that right here in Washington, D.C., we can know with confidence the order of the days. In other words, we can know when the seventh day of the week arrives.

But is this true only of Washington? No. Have they kept the true cycle of the weeks out in San Francisco? Most certainly. And if we should travel far across the Pacific and over the Trans-Siberian Railway into Europe, would we find the people there keeping the true cycle of the week unbroken through the centuries? Most assuredly. In short, no matter where we might go, we would find that the people know the weekly cycle, and therefore know when the seventh day of the week comes.

We can travel to any continent, without knowledge of astronomy or meridians and when we reach our destination, we simply inquire of the inhabitants of that place, and they can tell us what day of the week it is.

The fact therefore is clearly established, that the order of the days of the week is known in different parts

of the world, and that therefore the seventh day can be known and kept on every part of the globe. The apparent contradiction between this proven fact and the phenomenon of losing or gaining a day in travel, grows out of a double definition of words. Obviously, the difficulty in this particular case revolves around the word "day." We agree with the definition of the scientists that a day is the period of time that elapses during one revolution of the earth upon its axis. The Bible writers describe the day as the period from evening to evening, that is, from sunset to sunset. And what causes the sun to rise and set?—The rotation of the earth. There is complete agreement in definition of terms. In fact, the day is one of the most rigidly fixed units of time.

When we speak of losing or gaining a day in travel, we are really giving a new definition of the word. We are defining days, not in terms of the journey of the earth on its axis, but rather in terms of the journey of human beings around the earth, which is quite a different thing. The trouble, of course, grows out of the fact that the traveler moves from the given point at which he began to measure the day. If days be defined in terms of man's journey around the earth, without making allowance for his changing point of measurement, then the most unbelievable possibilities arise.

I believe I have answered the question which Doctor Marvin and his associates put before me at the meetings of the Foreign Affairs Committee. "Can the Sabbath be kept at the proper time on this round world?" I am convinced that it can and I feel that it has been properly observed and I do not propose to do anything which will interfere with the proper observance of either the seventh day Sabbath or the Lord's day Sabbath, according to the wishes of the individual.

I come now to the second of the very significant questions which Doctor Marvin asked of me, when he tried to break down our case in defense of the preservation of the

seven-day week, as we have it now. Doctor Marvin asked: "Why should you oppose the institution of a blank day when that is just what Moses did in order to adjust the calendar in his own time?"

Mr. Speaker, this question, too, would have seemed to me amazing and unusual, coming from a man of science, but I was familiar with the idea which he expressed because I had already studied that angle in my investigation of the whole calendar problem. When I heard these scientists speak of "Moses and his extra Sabbath" I knew that they referred to what was rather fully explained in the complete pamphlet entitled, *Moses, the Greatest of Calendar Reformers,* written by my questioner and critic in conjunction with Moses B. Cotsworth, of whom I spoke before. The booklet was published by the International Fixed Calendar League, which states its object in these words:

> It is the purpose of this pamphlet, first, to show how easily and completely the perpetual Mosaic calendar of the exodus can be reconstructed; and second, to show how very small and unimportant are the differences between it and the proposed 13-month calendar. * * *
>
> As soon as these great truths of modern research become known and understood, conscientious believers in Moses and the Scriptures need not oppose on any grounds, religious or otherwise, the suggested reform of the present unscientific, inconvenient, and unscriptural modern calendars. Rather should the restoration of what is best in the fundamental Scriptural calendar declared through Moses, be welcomed by all (p. 5).
>
> Had that Mosaic calendar been retained, all generations of Jews, Christians, and Mohammedans could have perpetually observed in unity all the commands of Jehovah, in complete yearly rounds of exact anniversary commemorations for all the great religious events, during their ancient united and later separate histories. * * *
>
> Therefore all nations of the world are to be invited by international conference to join in universal observance of the same six days of work, and especially of the same seventh day of rest on fixed yearly dates, as Moses prescribed (pp. 2, 3).

The questions are fundamental to the case, and I must bring to your attention what I believe is the actual explanation of the Mosaic calendar.

I shall not contest the explanation in this pamphlet concerning the fact that Moses, at the time of the exodus, established a solar calendar of 365 days. While this question is debatable, the results are not vital to the defense of my side. Neither shall I delay my argument by replying to the statement that "the Sabbath was not the seventh day of the week as we understand it to-day, but simply the seventh day after six days of labor," because the pamphlet brings no proof to bear on this point and it is simply a shot in the air.

The claim put forth in the pamphlet of Marvin and Cotsworth is that the fifth day of the third Hebrew month, Sivan, while reckoned as a day of the month, was not counted as a day of the week. This was the day of Pentecost. It was an "extra Sabbath," similar to the "blank day" of the present proposed calendar, according to their theory. In other words, although the 4th of Sivan was Sabbath, the 5th was not "Sunday," but simply a continuation of the Sabbath of the fourth—a blank day as far as the reckoning of the days of the week is concerned. Now 365 days equal 52 weeks plus 1 day. But this extra day being eliminated from the count of the weeks made the year really consist of an exact number of weeks. This caused the next year always to begin on the same day of the week as the year before. And, as a result the days of the week always bore the same relationship to the days of the month. Marvin and Cotsworth insist that Moses originated this blank-day principle, and they are simply striving to restore it by proposing that the last Saturday in December be followed by a blank day.

The first point that the authors attempted to make is that the Mosaic calendar was solar, which proves nothing at all.

They claim it proves that it possesses perpetual qualities on that account, but we can point to our present calendar, which is also solar, and show the opposite.

However, through the wording of the pamphlet, the reader is led to believe that since the Mosaic calendar was really solar he must be ready to accept everything else stated in the pamphlet! Not only are the arguments of the authors misleading, but even the evidence of outside witnesses is presented to give the impression that they are supporting all the arguments of the pamphlet, whereas some of the authorities quoted back only certain elements.

For instance, Dr. Julian Morgenstern, president of Hebrew Union College, and Prof. W. L. Heidel, famous Semitic scholar, are quoted in support of the solar nature of the ancient Jewish calendar, but they are mentioned together with other writers who support the "blank-day principle instituted by Moses" theory. I am very happy to bring to your notice some correspondence of my friend Mr. F. D. Nichol, of Takoma Park, D. C., with these authorities on the Hebrew calendar. Mr. Nichol wrote in inquiry:

> The writers of this pamphlet quote you as one of the authorities in support of the major premise of their thesis, because of your contribution on the calendar of ancient Israel. Your name and the quotations from your work, placed as they are in this pamphlet under the general head, "Some Authorities We Quote," lead the general reader to the impression that your researches warrant the ultimate conclusions to which the writers of the pamphlet come. I wish to inquire whether I would be correct in obtaining this impression. In other words, have your researches led you to believe, as do the writers of this pamphlet, that Moses devised a perpetual calendar that placed the Sabbath in a fixed relationship to the month, necessitating the existence each year of an extra Sabbath?

The reply of Doctor Heidel contained one sentence which you will agree summarizes his whole attitude:

> "Messrs. Marvin and Cotsworth have quite absolutely misrepresented my views."

Doctor Morgenstern's reply goes into the whole question quite thoroughly and I therefore bring it to your attention in toto:

THE HEBREW UNION COLLEGE,
OFFICE OF THE PRESIDENT,
Cincinnati, Ohio, January 30, 1929.

MY DEAR MR. NICHOL: Replying to yours of the 24th instant, I am very happy to be able to assure you that Messrs. Marvin and Cotsworth have used my name in their propaganda for the new calendar entirely without my authorization and knowledge, and that the quotations from my article on The Three Calendars of Ancient Israel apparently altogether misrepresent the facts with regard to the history of the calendar of ancient Israel which I have been able to establish. * * *

Certainly I did not advance the thesis "that the ancient Jews lived under a fixed or perpetual calendar devised by Moses," which caused the Sabbath always to recur on the same days of the month each year, instead of being an institution related only to the week, as we have it! On the contrary I showed in this article that, at various times in the history of ancient Israel, different calendar systems were employed, that up to approximately 621 B. C. the old Canaanitish calendar, a purely solar calendar, taking cognizance of the days of the solar equinoxes, was employed in ancient Israel. Then about from about 621 to a time somewhat later than 400 B. C. another calendar, apparently a lunisolar calendar, was employed, based apparently largely upon some Babylonian model. It apparently took no cognizance whatever of the Sabbath, which continued a weekly institution, falling upon any date in the month, regardless of any considerations other than that the Sabbath came every seventh day. At some time after 400 B. C. the calendar at present employed by the Jewish Church, also based upon Babylonian antecedents, was instituted. This also makes no effort to coordinate the Sabbath with any particular days or dates in the month.

I showed likewise that at some time, probably in the third century B. C., an attempt was made to introduce into ancient Israel a calendar similar to that which Mr. Cotsworth is championing, with the year divided into 13 months of 28 days, and with particular attention given to the coincidence of the Sabbath with a particular date in each month, probably the seventh, fourteenth, twenty-first, and twenty-eighth days. This calendar is employed as the basis of reckoning in the books of Jubilees and Enoch, two pseudepigraphical writings which were never regarded as authoritative. This calendar, however, was never recognized as official by Judaism and never came into actual use. Furthermore, Moses himself had no connection whatsoever with any of these calendars. It is clear therefore, that the above-named gentlemen have either not troubled to read my article carefully, or, if they did, have not understood it or have not wanted to understand it. Certainly, the facts which

they state and the conclusions which they drew from them are altogether unwarranted by my article.

I trust that this gives you the information which you desire.

Very sincerely yours,

JULIAN MORGENSTERN, *President.*

Need I say more, Mr. Speaker, about the authorities upon which Marvin and Cotsworth rested their case? It seems to me that we have here sufficient evidence to convince anyone that there is absolutely no basis to the theory propounded. I can say to you most emphatically that whatever adjustments, changes and variations have occurred in the Jewish calendar from the earliest period down, the one central feature always was to maintain the week of seven days without any interruption whatsoever. Moses was not the author of the blank day principle, and much as I believe that Moses was a great prophet and a wise man, I am not convinced that he could foresee what some scientific authorities of the nineteenth and twentieth centuries might invent, namely, a "zero day"!

The strongest link in their attempt at proving that Moses skipped a day in order to make the Pentecost come on the Sabbath Day is a text which they quote from our Bible. Leviticus xxiii: 15, 16, 21:

> Ye shall count unto you from the morrow after the [Passover] Sabbath [the fifteenth of the first month, Abib], from the day that ye brought the sheaf of the wave offering; seven Sabbaths shall there be complete: even unto the morrow after the seventh Sabbath shall ye number fifty days.
>
> Ye shall make proclamation on the selfsame day [that is, on the fiftieth day, Pentecost]; there shall be a holy convocation unto you; ye shall do no servile work.

The calendar authors understand the term "Sabbath" in this passage to refer always to Sabbath days. Thus they claim that they are placing two Sabbath days together, because "the morrow after the Sabbath" was to be a Sabbath also—Pentecost—an entirely impossible theory.

If you desire to see the Jewish normal interpretation of these verses based on the authorities in past ages and

our own time, I refer you to the translation of the Bible issued by the Jewish Publication Society of America:

> And ye shall count unto you from the morrow after the day of rest [Sabbath, in Hebrew] from the day that you brought the sheaf of the waving seven weeks shall there be complete; even unto the morrow after the seventh week shall ye number fifty days; and ye shall present a new meal of offering unto the Lord.

This represents a very old controversy. According to the Jewish tradition, the Biblical commandment to offer the omer (measure of barley) "on the morrow after the Sabbath" was interpreted by the rabbis to refer to Passover, so that it meant that the seven weeks should begin to be counted from the first day after the beginning of Passover. There was an early interpretation that it should begin on the first day after the first Sabbath during the Passover, which would make Pentecost always fall on Sunday. This sectarian view has completely disappeared.

But what I would point out to you is that even this sectarian view in no way favors the idea of a wandering Sabbath. It rather emphasizes the word "Sabbath" so that it could not be used even for another holiday.

Every scholar of the Bible that I know of has corroborated this statement and I feel certain that it destroys entirely the false claim that Moses skipped a day and changed the regular succession of seven days of the week.

One bit of evidence on this double-Sabbath argument remains to be answered. After declaring that in ancient times the Jews kept such a double Sabbath, the authors add this persuasive claim!

> The significant fact remains, that through traditional usage the Jews generally continue to observe two consecutive days at the feast of Pentecost.

In reply we inquire: If at the present time a devout Jew can observe two days at Pentecost without breaking the cycle of the week, why could he not have done so in ancient days?

The facts are that when the Jews were dispersed from Palestine, they began the custom of keeping two days in connection with each annual Sabbath (festival), expecting Atonement Day, for fear that in their reckoning of time they might have made an error of a day in determining the beginning of a month. (The explanation for the failure to observe the two days in connection with Atonement Day is that it would have necessitated 48 hours of complete fast.) By the time a calendar had been agreed upon by the "Dispersed Jews" throughout the world, during the fourth century A. D.—the custom of celebrating two days for each feast had become so firmly established that it was retained by most Jews. This second day that is kept in connection with each of the annual feasts is described in Hebrew by a phrase which, translated literally, means: "The second day of the holiday observed in lands of exile." The custom has never been followed by the Jews in Palestine, for the simple reason that they had no cause to be uncertain over the reckoning—they were not in exile.

Therefore, for the purposes the authors intended, "the significant fact" of the double Sabbath now kept by Jews in various lands, has no significance. Instead it has a significance on our side of the argument. The very fact that the reckoning of months presented such difficulties when the Jews moved from Palestine, reveals that absolute confusion into which the Sabbath institution would have been thrown, if it had been related to the months, as this unwarranted theory contends. Only by being wholly free of any calendar could the Sabbath be kept in various lands.

We discover, therefore, from an examination of Jewish history and from a study of the different senses in which the word "Sabbath" may properly be understood, that the arguments built upon Leviticus xxiii 15, 16, 21, have no foundation.

I believe I have disposed of every possible argument which our opponents brought up before the hearings of

the Foreign Affairs Committee of Congress. I have even taken up matters which the proponents of the 13-month plan have written about in material not submitted to our committee. My case is complete and I find that there are just a few loose threads that I need gather together to have placed the whole proposition before you from a historic, scientific and economic viewpoint, not to mention the all-important religious sentiment involved.

There was one interesting point brought out at our hearings before the Foreign Affairs Committee which I do not believe has been properly emphasized. We heard many representatives of leading business firms in the country expounding the advantages of the 13-month plan. They spoke from experience, for some of them had been using this scheme for 10, 15 or 20 years. We were given to understand that business efficiency was increased tremendously and that for their particular concern the adoption of the 13-month plan meant a great step forward. In almost every case I questioned the witnesses about the practicability of this 13-month plan in conjunction with the present calendar, and I was pleased to learn that after a short period of adjustment all employees were able to conduct their affairs efficiently, although they had a different calendar for the management of the business.

In other words, I learned—and I believe that my colleagues in the committee were also convinced—that it is entirely possible to reap the advantages of this 13-month calendar without upsetting the whole world. My claim therefore is that those firms which see real benefits in the adoption of this scheme should do so. No one will interfere with them.

I sincerely believe that every business man can utilize the 13-month plan without making it necessary to have Congress or state legislatures or the League of Nations foist this new scheme on an unwilling and unprepared world.

Touching on the fact that the resolution before our committee was introduced to ratify the action of our delegates at the Habana conference, may I quote one of the ranking members of our committee in a statement he made to our committee on Friday, December 21, 1928. I quote my colleague, HAMILTON FISH, of New York, verbatim:

> I have heard it stated here both by the introducer and by Mr. Eastman, that one of the main bases of this resolution was the fact that it had been endorsed by the Pan American Conference. I had the pleasure last night to dine at the same time with Mr. Hughes and had the opportunity to talk with him after dinner. Mr. Hughes told me that Mr. Eastman's representatives came to him at the Pan American Conference and wanted him to introduce this resolution. Mr. Hughes told me that he told them that he had other troubles and matters to discuss and he did not even know that the Pan American Conference had passed this resolution.

I mention this because of the claim by some advocates of the plan that it is the duty of Congress to ratify the action of the Pan American Conference. There is no such "duty" for us. We are free to consider this on its merits.

PERPETUAL CALENDAR[6]

The proposed plan seems to me to have two very serious disadvantages.

In the first place it differs so radically from the present calendar that it is very doubtful whether a sufficiently large number of the important nations of the world could be induced to consent to its adoption.

In the second place, in this proposed calendar the unit, the year, is divided into a prime number (13) of parts. To my mind this is a fatal defect. I know of no table of weights or measures now in use in which this is done.

Every mathematician knows that twelve would be a

[6] From article by A. L. Candy, University of Nebraska. *Science*. 61: 286-7. March 13, 1925.

much better number for the radix of our system of natural numbers than ten. This is because twelve is divisible by 2, 3, 4 and 6, whereas ten is divisible by only 2 and 5. A system using thirteen for a radix would be an abomination for very obvious reasons. For the same reasons it seems to me that whenever and however the calendar is revised, twelve should be retained as the number of months in the year.

A large number of business obligations are made to run for three, six and nine months. Interest on long time notes and bonds as well as dividends on most stocks are made payable either quarterly or semi-annually. A few companies pay dividends as often as six times a year. For simple convenience in conducting this enormous line of business, it is vastly more desirable to have the number of months divisible by 2, 4 and 6, rather than to have a prime number.

Furthermore, it is not necessary to make any radical change in the calendar now in use in order to secure a perpetual calendar. The simple plan herewith suggested involves only slight changes. One day is taken from August, and added to February; one day is taken from May and added to April; and the last day of December is set apart for "New Year's day" the same as in the plan referred to above. Likewise the "Midsummer Holiday." This makes the year consist of four equal parts with three months or 91 days in each quarter. The first month in each of these four quarters, *viz.*, January, April, July and October, has 31 days, and the first day of each of these months will always fall on Monday; the second month of each quarter has 30 days with the first always on Thursday; and the third month in each quarter has 30 days with the first on Saturday. Thus the first day of a month would never fall on Sunday. Also an obligation running for any multiple of three months would always fall due on the same day of the week as that on which it was made.

Such a calendar as this could be put into effect some year when the first day of January falls on Monday without causing any appreciable disturbance in the larger affairs of the world. No important anniversaries in this country would be changed. A comparatively small number of birthdays would be dislocated, but this would not be serious.

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